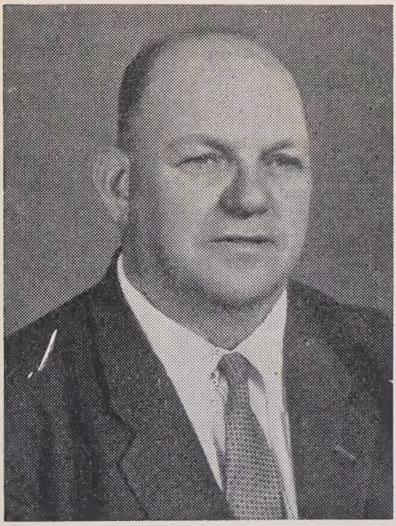
New Year Message from the Minister for Agriculture and Stock

As may be verified in detail from the annual report presented to Parliament in November, my Department carried out a great deal of valuable work during the past year on behalf of Queensland primary producers. In spite of the adversities of hard seasons, this work will go on and will expand with the needs of the State.

It might not be out of place in this new year message, to refer briefly to a number of activities with which my Department is preoccupied:



Research work on wheat produced a new variety which gave the highest yield in varietal trials carried out on the open plain country of the Darling Downs. More work will be done this year on breeding for rust resistance and frost resistance, high yielding capacity, and flour quality. A hybrid sorghum breeding project is being developed, while the new year will see expanded research into tobacco, as well as further development of investigations and demonstrations with pastures.

An expanded research programme is being planned on the citrus industry's problem of fruit-sucking moths. Success was achieved in 1958 with the production of a rust-resistant bean, and improved apple storage methods.

An interesting project of the newly established Economics Research Branch of the Division of Marketing is an investigation of dairy cattle feeding costs.

Progress is still being made in the long-range plan at Toorak Field Station, where sheep breeding performances are tested with the idea of selecting and developing strains capable of reproducing more satisfactorily than has been the case under Queensland conditions. The very important problems of drought feeding of cattle and sheep, and of copper and phosphate deficiencies, are being tackled.

The new pig testing station at Rocklea will enable pig breeders to improve the quality of their stock, and to achieve an appreciable saving in production costs. Random sample testing of poultry breeding flocks is being conducted, as well as investigations into nutritional and management problems.

I have mentioned but a few projects of my Department, to show producers that we are working earnestly and searchingly on their behalf. It remains for me now to extend a sincere wish to all for a happy and prosperous new year and good seasons in the future.

Otto Madsen

Plate 1: **A Perennial Crop Such as Lucerne Can be the Backbone of Any Dairy Feeding Plan.**

Balanced Farming Comes In Stages

**By J. L. GROOM, Senior Agronomist,
and A. HEGARTY, Agrostologist.**

Balanced farming implies "making the most of the least." All too often the apparent glitter of one spectacular farming practice deceives farmers into neglecting more simple farm management practices. Yet these simple practices can so often make the difference between "breaking even" and making a worthwhile profit from any farming venture.

The application of a number of simple farm management practices has enabled Mr. E. Shield of Moggill to carry 67 head of stock on 68 acres, and maintain an average yearly production of 25,000 gallons of milk.

Balanced farming comes in stages and it is interesting to survey the progress made by Mr. Shield in the last 22 years. Let's see how he went about it:

Plate 2.

Sane Mechanisation Can Prove a Blessing on Any Farm.

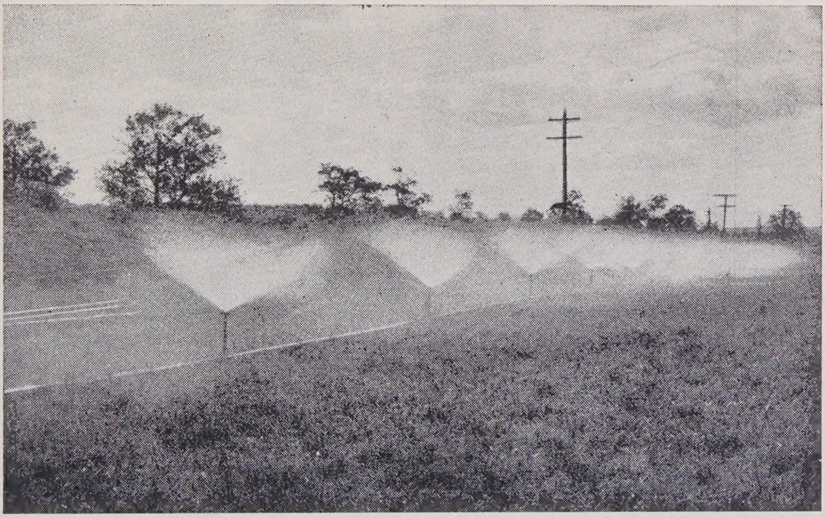


Plate 3.

Irrigation Increases the Productivity of Crops Grown in Fertile Soil.

Plate 4.

Green Panic and Lucerne Combine to Produce Valuable Bulk Feed.

Because his was a milk farm, and so needed a continuity of supply, Mr. Shield constructed feeding stalls many years ago and fed bought concentrates together with hand-chaffed bulk feed from his cultivation.

His first move to relieve himself of the risks involved in annual crop production was through the establishment of additional paddocks of lucerne. He now has 20 acres of lucerne and lucerne-grass mixtures, which provide a solid backbone to his farm feeding programme. From this area he gets high-quality, protein-rich roughage which enables year-long stall-feeding to be undertaken. Fifty tons of chopped hay comes from this area yearly in addition to valuable grazing in the autumn, winter and spring.

As lucerne proved its value, its usefulness was extended further by the installation of a spray irrigation plant in 1941. The farm layout is such that this irrigation plant can water approximately 40 acres of cultivation.

Naturally, on a one-man farm there is a limit to the amount of land which can be irrigated. Also it is obvious that more and more lucerne hay is needed for winter and spring months when the couch grass pastures are unproductive. So pasture areas of lucerne and Rhodes grass, and lucerne and green panic, were established to increase the volume of paddock-grazing during the summer. Fertilizers helped here as they had done with the lucerne and other crops. Grazing management made better use of all the grass feed not made into hay.

The growing of green crops for cutting and feeding has always been of prime importance on this property, and 14 acres have been devoted to crops of maize, sweet sorghum, Sudan grass, wheat, field peas and oats. Until recently this large tonnage of green material was mown and hand-chaffed for the stock.

Probably the most significant step in the handling of forage crops on this farm has come from the purchase of a forage harvester, with attachments which allow the crops to be cut in the swathe, harvested as a row crop, or picked up from a windrow. This machine has the ability to cut green feed quickly and economically, to cut and chaff the cured hay so that it can be stored in the shed ready to be fed out, and, finally, to cut surplus bulky maize and sweet sorghum to store as silage.

In making silage, crops have been cut at the best stage of maturity for feeding, instead of having them stand over, and become fibrous and wasteful. The cultivations are cleared sooner and can be fallowed longer.

Mr. Shield is improving the fertility of his land by using two and a half to

Plate 5.

Green Feeding, Silage Making, and Hay Chopping Allow This Machine to Work Economically on This Property.

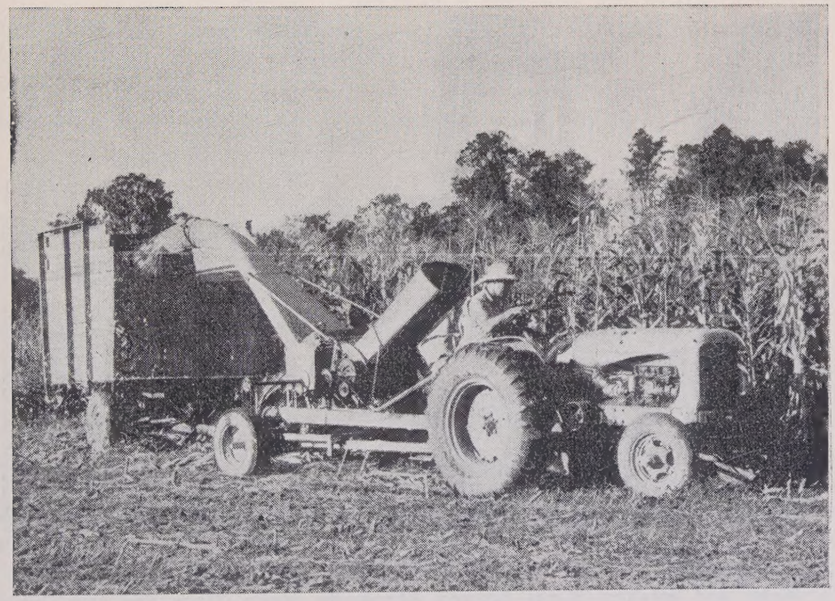


Plate 6.

Silage Making is Possible on One-Man Farms With an Outfit Such as This.

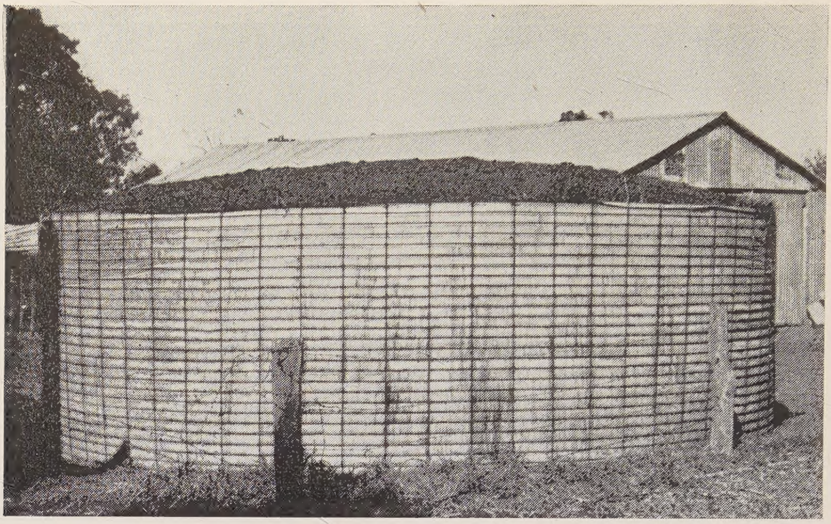


Plate 7.

Surplus Summer Fodder Can Be Effectively Stored in a Simple Silo.

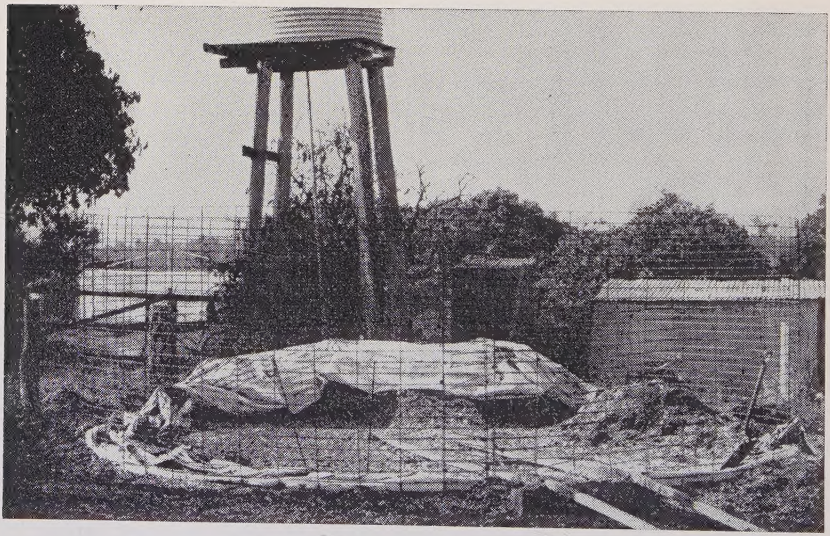


Plate 8.

Maize and Sorghum Silage Showed Almost No Waste When Fed Out This Spring. Temporary wooden rails enabled the feed trolley to be taken right into the silo as feeding-out progressed.

three tons of mixed fertilizers annually, and by returning dung to the paddocks during rotational grazing. Nitrogen-phosphate fertilizers provide a valuable stimulus to his crops and pasture mixtures. Here his combination of the simple farm management practices of regulated watering, fertilizing, and rotational grazing are giving him high yields.

There is naturally still more to be done, but Mr. Shield has proved to his own satisfaction that despite the small size of his farm, he is capable of providing all the bulk feed needed for his herd's high production. Supplementation of his high-quality, home-grown roughage with purchased dairy meals enables year-long stall-feeding to be undertaken. Stored summer surpluses have an important place in easing the feed shortage normally experienced in late winter and early spring.

As Mr. Shield's dependence on bought feeds is reduced, his faith in the obvious truth of a balanced farming system strengthens. Sane mechanisation has proved a blessing on this farm.

Keeping Leather Gear in Order

"Old Timer," of Goondiwindi, writes: One thing that we have been making lately is neat's-foot oil, for oiling and preserving the saddlery. On the occasions when we killed a bullock for rations last winter we kept the leg bones below the knees and hocks.

I'm not sure whether you have the recipe or not, but if you haven't, this is it:

Boil the leg bones in water in an old copper, allowing to simmer gently for two hours. Skim off the surface oil; keep the contents of the copper simmering for a while, and you can get a second skimming. Strain the collected oil through cheesecloth and boil it again on a very slow fire, so that it will not catch fire. Then strain it again, allow to cool, and bottle it in beer bottles, clearly labelled.

When the boys have made their own neat's-foot oil it gives them an inducement to try it out on the saddlery, and so keep the gear in good order.

On the sheep station twenty and thirty years ago, wet weather gave good opportunities for make-and-mend days in the woolshed. At such times we, as jackeroos, would make hobbles, reins, surcingles, and even bridles from good side leather. Generally the stitching and quality of the leather on our own make of leather gear was twice as sound as on what we used to describe as "jail made" bought leather gear, which generally comprised the cheaper type of leather gear that many stations carried in their stores for replacements. During these wet weather "sessions" which were welcomed as a relief from the mustering camp life, we would also make fly veils from basil (tanned sheepskin), plaited and twisted branding ropes from greenhide, neck and verandah water bags from canvas. Every jackeroo and station hand learnt to handle saddler's awl, needles, and clamps. The clamps were always called "saddler's clams," and were made from two staves of a wooden barrel, held together at one end by a nut and bolt and washers. The " clams " were held between the knees, and the strap or leather being sewn was held firmly by the top end for sewing. No buckles, rings, or " D's " from obsolete saddlery or worn out leather gear were ever thrown away if still serviceable; they were treasured by the "bower-birds" of the mustering camp and used in replacements. I have a pair of swag straps that I made thirty-five years ago and the stitching is still sound.

Farm Wisdom

LONG-TERM studies at Agriculture Department Regional Experiment Stations are demonstrating to Queensland farmers the way to restore and maintain the fertility of their soils.

It has been found that, where the land is cropped, continued high production demands the use of pasture in the crop rotation. This in turn calls for some form of animal husbandry to make economic use of the pasture.

The value of this balanced farming system is being demonstrated in southern, central and northern Queensland. In all these regions, the Department is studying the effect on soil condition and crop production of different methods of land use.

A recent trial at the Hermitage Regional Experiment Station clearly indicated the benefits of balanced farming. Here it was shown that the productivity of the Darling Downs wheat lands can be restored and maintained with lucerne pastures. Given five years under lucerne, grain yields from the land have shown improvement after three years of cropping and this effect looks like continuing.

On the deep, rich soils at Hermitage, lucerne was chosen for the pasture because of its drought resistance. The pasture is used to fatten sheep, so that the land will still be returning cash, even though it is temporarily retired from grain. At the same time, the lucerne improves the soil. Being a legume, it increases the available nitrogen in the soil for the following crop, and it has been proven as a plant to improve the physical condition of the soil.

When the trial area at Hermitage has been under lucerne for three to four years, it is ploughed during the autumn. A crop of grain sorghum is grown the following summer to take advantage of the good percolation of summer rain into the soil that takes place because of its improved physical condition.

The grain sorghum is followed by a year's fallow, and the land is then returned to three seasons of winter cereals. After that, it is again put into lucerne.

The Downs soils are used fairly intensively to grow winter and summer grains, and between crops they are usually left under fallow. This cropping system reduces the amount of organic material in the soil. As a result, the soil is likely to lose the good physical condition needed both for high yields and to protect it from erosion. A pasture rotation would greatly benefit many areas on the Downs in this respect.

—*W. J. CARTMILL, Director of Regional Experiment Stations.*

LIGHT, flexible tyre rollers can render valuable aid in the establishment of cereal and lucerne crops and of pastures.

They gently firm the seed into close contact with the soil, ensuring even germination, maturity and harvest of the crop.

The benefits of rolling are particularly obvious when sowing has been carried out on a seed bed in which moisture conditions are not very good.

A light rolling is highly recommended when establishing pastures or lucerne. It can often mean the difference between success and failure.

Rubber tyre rollers can be made very cheaply on the farm from old baldy motor tyres. They are fitted side by side onto a braced hardwood frame of 4 ft. x 2 ft. Baldy tyres are best because they do not pick up soil as easily as a tyre with tread on it. If necessary, a piece of K wire can be loosely stretched over the top of the roller to act as a scraper.

The rollers are made as wide as the seed drill and follow behind it. If the soil is a bit damp, they can be off-set to roll the previous drill run.

Rollers are particularly beneficial on light friable soils. Farmers who have used them are very pleased with their results.

—*D. R. EVANS, Assistant Experimentalist.*

IT is almost impossible to grow tobacco without using insecticides to control leaf pests. But spray at the right time and with the right strength and rate of application of insecticide to keep costs low.

Plants should be treated with a combined spray of endrin and DDT or dieldrin and DDT in the seedbed immediately before transplanting. After transplanting, they should be sprayed weekly with the same preparation for the first three weeks. Later sprayings should be timed by observations on the presence of young stages of the leaf pests.

Either endrin or dieldrin will control the leaf miner, looper, stem borer and cluster caterpillars. DDT will control budworm and all other pests except looper. Endrin used at 10-day intervals is usually sufficient to control loopers if the spraying is thorough. When budworm is prevalent, weekly sprayings with DDT are necessary to protect the plant hearts.

—*G. W. SAUNDERS, Entomologist.*

A SOIL auger and a soil probe should be the constant companions of every irrigation farmer. Used regularly, the soil auger tells a farmer when his crop needs water and the probe when it's had enough.

The aim in irrigation farming is to maintain sufficient water in the main root zone of the pasture or crop for vigorous, unchecked growth. A series of borings with a soil auger provides a simple, but reliable check on the dryness of the soil. Make test borings a regular procedure so you can determine just when irrigation is necessary.

The probe is used during irrigation to find out when sufficient water has soaked into the root zone of the crop. It gives an approximate, but practical, measurement of the depth to which the water has penetrated.

If you're not familiar with these tools, ask your Adviser in Agriculture to show you how to use them.

—*A. NAGLE, Irrigationist.*

IT'S easier to thin out a heavy stand of cotton than to try patching up a gappy one. The later plants never seem to catch up with the original planting and yields are affected.

At the same time, replanting adds to the expense.

While germination percentages have improved with seed treatment, favourable conditions are necessary to obtain a regular stand with sowing rates of 10 lb. per acre. If a storm follows planting and a dry crust is formed above the germinating seed, a lot of pressure is needed to break through. A thick planting allows the lengthening young stems to force a crack in the crust where lighter rates may fail to push through.

Another 5 lb. per acre costs only 2s. 6d. but it may be worth pounds later on.

—*W.G. STEELE, Senior Adviser in Agriculture.*

Look After Your Tractor Air Cleaner

By C. G. WRAGGE,
Agricultural
Engineer.

REGULAR attention to the air cleaner on your tractor will help to safeguard the engine and give you more working hours between overhauls. The air cleaner's job is to remove dust particles from the air so that only clean air is drawn through the carburettor.

Early tractors were not fitted with air cleaners. Under dusty conditions, the life of an engine was often only a couple of hundred hours. But today efficient air cleaners are used, and you can count on them to save engine wear. It is noteworthy that for combustion, a gallon of petrol requires about 1,400 cu. ft. of air, while a gallon of diesel fuel requires about 1,800 cu. ft.—in each case the volume of a fairly large room.

In modern air cleaners, air is drawn into a removable dome fitted to the main air tube. The underside of the dome has fixed metal louvres. The resultant swirling effect throws the heavier dust particles to the outside and fairly clean air passes down the air tube to the oil bath. This air passes first through the oil bath and then through wire screens which filter out oil sludge and any remaining dust particles.

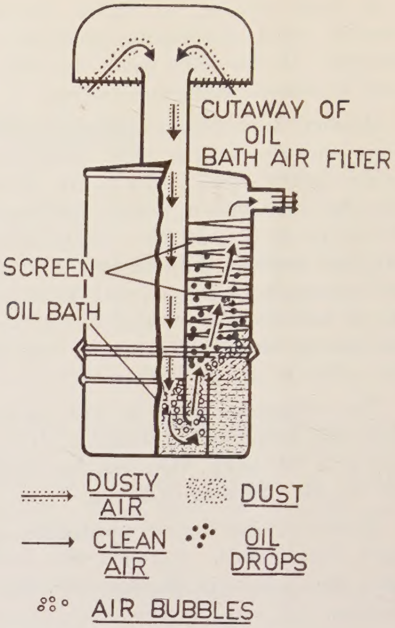


Plate 1.

KEROSENE RINSE.

These wire screens need regular cleaning to prevent choking with oil sludge or dirt. As they are usually metal-framed and are non-removable, the best method of cleaning is to rinse the whole cleaner thoroughly in kerosene.

Most air cleaner oil baths hold from one to three pints of oil. Under dusty conditions, clean the oil bath and refill it once a day before use; under very dusty conditions, clean and refill twice a day. Under fairly dust-free conditions, such as when mowing lucerne, cleaning once a week may be sufficient. Use only clean engine oil and fill to the level mark.

The benefit of the air cleaner will be largely lost if the hose connections to the carburettor are perished. Renew these short lengths of hose frequently and tighten the clips regularly.

Remember, the life of your tractor depends directly on the care and attention you give to the air cleaner.

Steps To Correct Magnesium Deficiency In Citrus

By G. W. J. AGNEW,
Senior Experimentalist.

Magnesium deficiency in citrus is a nutritional disorder which occurs fairly commonly in orchards on the acid coastal soils of Queensland. Leaf symptoms are usually conspicuous in the late autumn and winter months and are particularly acute during very wet years such as 1954-55.

Magnesium occurs in the soil mainly as magnesium carbonate and passes readily into solution. It is therefore easily leached out of well-drained and highly acid soils during periods of heavy rains.

As one of the essential elements for plant growth, magnesium is a key substance in the formation of chlorophyll, the green colouring matter of leaves, twigs, and fruit which plays a vital role in the building up of organic products within plant tissues. It is closely associated with the manufacture of the phosphorus-rich organic compounds needed for seed development.

All kinds of citrus have a high magnesium requirement but seedy varieties such as Joppa and Valencia Late oranges require more of this element than seedless varieties such as Washington Navel.

Magnesium moves, or rather is translocated, readily from one part of the plant to another. During the late autumn and winter months, the fruit is nearing maturity and the need for magnesium is at its peak. The drain on the magnesium supply within the tissues at this time of the year coincides with a relatively low intake from the soil. Under these circumstances, magnesium is translocated from the old leaves to the developing fruits and other parts of the tree where it is in demand. The old leaves lose much of their green colour and yellow blotches become conspicuous, particularly on leaves near the hanging fruit. The appearance of these yellow blotches between the leaf veins near the midrib is the first symptom of magnesium deficiency.

These Are The Symptoms.

Nutritional disorders in citrus are sometimes difficult to diagnose and abnormalities induced by insect pests and diseases often mask normal symptoms of a deficiency of magnesium. This is particularly so in many of our coastal orchards where chlorosis or yellowing of the leaves is frequently associated with deficiencies in nitrogen and/or zinc.

In a typical case of magnesium deficiency, the irregular yellow blotches in the older leaves eventually coalesce and only the base and tip remain green until complete yellowing takes place and leaf fall occurs. A fairly consistent symptom is an arrowhead of green at the base of the leaf.

Plate 1.

Valencia Late Orange. Young tree carrying a full crop. A deficiency of magnesium at this stage may substantially reduce production in the following year in coastal districts.

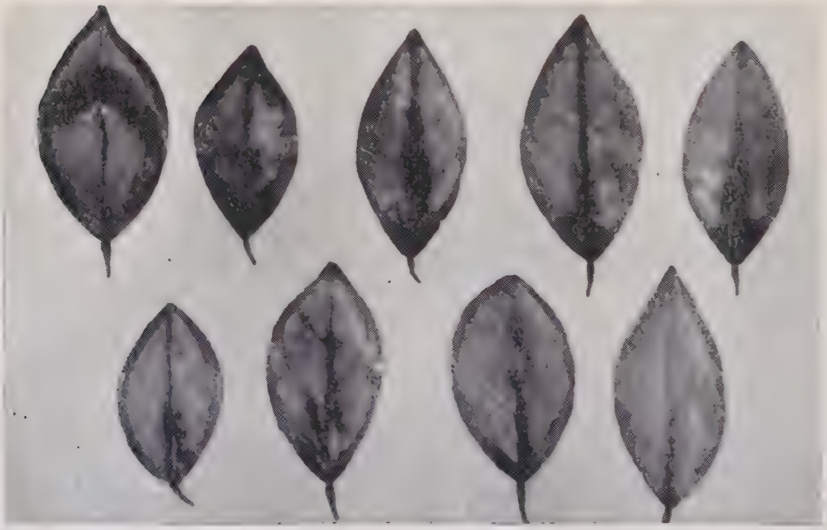


Plate 2.

Leaf Symptoms of Magnesium Deficiency in Citrus. Note bronzing of the interveinal tissues and the arrowhead of green at the base of the leaf (upper right).

The primary yellowing symptom of magnesium deficiency is often referred to as "bronzing" and occurs in patches of varying intensity over the foliage of the tree. It may be more acute in some trees than others. As a general rule, it is more common on the North Coast in Joppa orange, Valencia Late orange, grapefruit and lemon than in mandarins.

In acute cases of magnesium deficiency, leaf fall is often followed by twig dieback which necessitates a considerable amount of dead wood pruning in the following winter. In such orchards, the succeeding crop is often very light. After years of heavy rainfall such as 1954, crop yields decline considerably in orchards where symptoms of magnesium deficiency are acute.

What To Do About It.

On very acid soils, loss of magnesium by leaching is high. This does not necessarily mean that deficiencies occur only on very acid soils. Nevertheless, many of our coastal citrus orchards are strongly acid with reaction values ranging from pH 5·2 down to pH 4·1. On such soils, dolomite (a mixture of calcium and magnesium carbonates) is applied as a soil dressing to bring the soil reaction value nearer to pH 6·0, which is generally regarded as being the optimum for citrus and, at the same time, to supply additional magnesium to the soil.

An annual dressing of from 1–2 tons per acre until the symptoms of magnesium deficiency disappear has proved an effective remedy in commercial orchards. Preferably part of the dolomite should be broadcast in early summer and part in autumn, a few weeks before (or after) one of the standard fertilizer applications.

On some soil types, particularly those on which the soil reaction is close to the optimum value for citrus (pH 6·0), a better response may be obtained from soil dressings of magnesium sulphate at ½–1 cwt. per acre or, alternatively, a mixture of both dolomite and magnesium sulphate.

The correction of magnesium deficiency in citrus orchards is a slow process and may take more than one season. In common with other nutritional disorders in citrus, magnesium deficiency symptoms indicate the need for an urgent review of soil management practices. For example, many of the lighter sands and sandy loams require additional organic matter to improve the uptake of plant foods from the soil. This can be supplied by growing green manure crops in the orchard, by growing them in adjacent land to supply material for mulching the orchard, and by the liberal use of farmyard or fowl manure.

In many coastal orchards, the placement of fertilizer is often far from satisfactory; too much is placed in the drip zone of the trees and insufficient in other areas which are also occupied by the feeding roots. Large quantities of fertilizer regularly placed in a narrow band around a citrus tree tend to create very acid conditions in the underlying soil, to accentuate leaching of magnesium and other nutrients and, in some instances, to destroy the roots.

In a series of tests conducted in the Maroochy district, the mean reaction value under the drip of mature trees was pH 4·2, as against a mean value of pH 5·3 some 8 feet away in the centre of the row. Dressings of fertilizers and soil amendments such as dolomite should obviously be so placed that the trees get the maximum benefit without inducing marked variations in soil acidity within the orchard. They should therefore be distributed over the whole area normally occupied by the roots of the trees.

In an orchard of mature trees of, say, 10 years of age, with the normal spacing, this may mean the whole of the orchard.

Green Fingers

THE long or snake bean deserves a place in the vegetable industry. This summer vegetable yields good crops and will supplement the supply of green vegetables during the hot weather. It is a good substitute for the French bean.

Long beans will grow on a wide range of soils. But well-drained loams with a large amount of decomposed organic matter are the most suitable. Before planting, fertilize the land with a liberal dressing of well-rotted manure or a 4:15:2 or similar complete fertilizer, putting on about 2 to 2½ lb. to the chain of row.

The planting season extends from September to early March in north Queensland and from September to early February in the south. Plant the seed about 1 in. deep at spacings of about 10 in. in the row. The long bean is a climber, so you'll need to provide stakes or some other support.

—*K. M. WARD,*
Senior Horticulturist.

SETTING the right follower at the right time is the only way to control cropping in bananas. Highest returns per acre can be expected only in plantations where crop control is practised.

The aim of the efficient grower is to harvest the bulk of his fruit between April and November. For this reason followers for the ratoon crop should be selected so that they will bunch in February or March.

The sucker selected for the follower should be deep-seated, with a well-developed corm and narrow, sword-shaped leaves. This type of sucker usually appears above ground shortly before the parent plant throws its bunch, and should be about 2 ft. tall in December. Followers set in December produce bunches in March, some 15 months later, and provide the bulk of the winter fruit from the ratoon crop.

—*J. McG. WILLS,*
Senior Adviser in Horticulture.

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Fertilizer and Soil Acidity

The response of fruit and vegetable crops to nitrogenous fertilizers is often unsatisfactory on land that has been cultivated for many years and is strongly acid. High acidity in the wetter coastal soils must be corrected if the grower is to get best results from applied fertilizers, states Mr. L. J. Missingham, Adviser in Horticulture.

Sulphate of amonia, for example, is used at rates up to 5 cwt. per acre per year, for year after year. The fertilizer reacts with the calcium in the soil and much of the calcium is leached out in wet weather. As a result, the soil gets more and more acid every year.

The remedy is to apply agricultural lime or dolomite at regular intervals. As a guide, you can assume that one ton of lime or dolomite will offset the acidifying effect of one ton of sulphate of ammonia. In most horticultural districts, one ton of lime or dolomite every second year, or two tons every fourth year should prove satisfactory.

Plant Sword-Leaved Banana Suckers

By F. W. BERRILL,
Horticulturist.

The sword-leaved banana sucker should be used as planting material in preference to the broad-leaved sucker.

The type of planting material which is used for the establishment of of a crop is always important. In a crop such as the banana, which remains in production for a number of years, the quality of the planting material frequently determines the success or otherwise of the plantation. Where "bits" (sections of a healthy stool) are not available, the grower must commonly use "suckers" (offshoots from a corm) as planting material. In commercial practice only vigorous sword-leaved suckers should be planted.

Most plants pass through a series of more or less well-defined growth stages during their life. In a crop which is propagated from seed, we refer to the seeded plant as a seedling. At a certain point, the plant passes beyond the seedling stage. But what determines the point where the changeover takes place from one stage to another? This is a difficult problem to answer, for many factors are involved, most of them being concerned with the nutrient supply, climate and, of course, the inherent characteristics of the species.

It is somewhat easier to answer another question: "How does the [illegible] when the plant has passed from the seedling stage?" In many instances, the transition is recognised by obvious changes in habit, leaf colour, growth rate, or leaf size and shape. An excellent example of leaf variation occurs in the carrot, the first-formed leaves of which are simple and elongated whereas those produced later have a characteristic fern-like appearance. Likewise, the two simple leaves of the young bean seedling are followed by the typical three-lobed leaves of the older plant.

Plate 1.

Mons Mari Banana. The most important variety grown commercially in Queensland.

A plant does not pass directly from the seedling to the adult stage. On the contrary, it goes through several intermediate stages before it flowers and produces fruit.

In plants which are normally reproduced vegetatively, the position is somewhat different. Thus, in the case of the banana, the sucker is derived from a bud on the parent corm, and passes through an early developmental period which is generally designated as the juvenile stage. Just when the sucker ceases to be juvenile is a debatable point but the change is invariably distinguished by marked alterations in leaf size and shape.

SWORD-LEAF SUCKER.

The sword-leaf sucker of the banana plant develops from a bud on the parent corm. At the outset, the bud is made up of a number of small, spirally arranged scales which overlap each other and protect the central growing point. These scales are forced outwards—somewhat like the petals in an opening flower—by pressure from the central tissue of the expanding bud. The bud enlarges rapidly at first and the bud scales open out and are shed at a corresponding rate. This stage occurs below ground level but, when the new corm has reached a diameter of perhaps an inch or more, the sucker breaks through the surface of the soil. The time of appearance will depend very largely, of course, on the depth at which the young corm is formed.

The very young sucker is conical in shape and is composed of spirally-arranged layers of rudimentary leaves which carry little or no leaf blade. Usually, after the tip of the young sucker has opened, the following leaves are still little more than very narrow strips of tissue along either side of the midrib. Each successive leaf, however, is longer than its predecessor and slightly wider.

After producing some five or six of these "sword" leaves, a distinct change occurs and the young plant throws leaves with a shape approximating that found on a full grown stool except that they are smaller in size. When this point is reached, the sucker is said to have passed out of the juvenile stage.

COMPARISON.

Now let us consider why some suckers start off with narrow, sword-leaves and later pass to the adult form whereas others produce small broad-leaves immediately.

The explanation is bound up with the supply of plant foods which is available to the young plant.

At the outset, the sucker has no root system of its own and is entirely dependent on the reserve of food materials in the parent corm. As it develops from the sword-leaf to the broad-leaved form, it becomes progressively less parasitic until at length, it has its own root system and is almost completely independent. The length of time taken by the sucker to pass through the sword-leaf stage may, therefore, be regarded as an indication of the supply of nutrients made available to it from the parent.

If the sucker is broad-leaved at the outset, the supply of food materials from the parent plant has obviously been limited. This may occur in many ways. It is relatively common for broad-leaved, so-called "water suckers" to arise from old, rotting butts with little or no reserve of plant nutrients. Suckers which are wedged in between stones or tree roots, or are injured during chipping or spraying operations will often exhibit broad leaves earlier than usual. Weevil borer damage in the young corm also has a similar effect. Sometimes, mechanical obstructions between the sucker and the parent plant or other suckers may

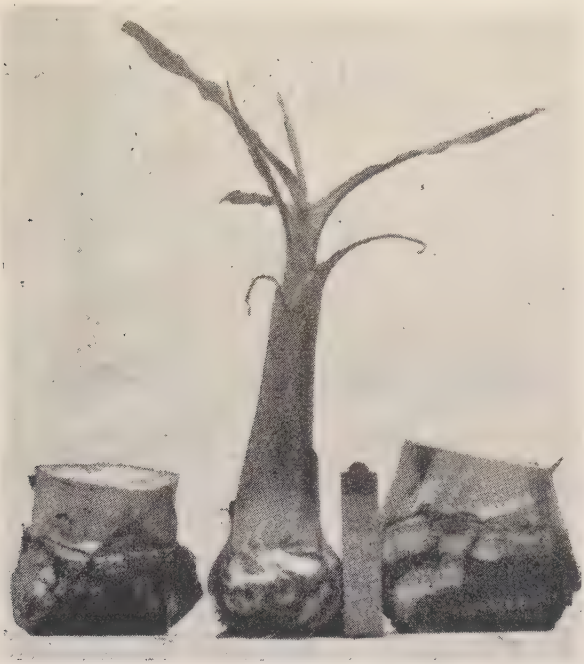


Plate 2.

Types of Planting Material—Left to Right: Corm, Sucker, Bit. Bits, 2-4 lb. in weight, are the best type of planting material. Sword-leaf suckers are, however, suitable for commercial use. Corms are seldom used; they are normally cut into bits.

prevent the free transfer of food materials from the mother corm, and a weak, broad-leaved sucker is produced.

ADVANTAGES.

From the practical point of view, there is one major point to be borne in mind. The broad-leaved sucker has a lower reserve of food material than its sword-leaved brother as is evidenced by the much smaller size of the corm. It is therefore a much weaker plant and should not be used as planting material.

It has been said that "a banana will grow irrespective of what type of material is planted, given suitable conditions." That statement is accurate enough but who can guarantee that the new planting will experience favourable climatic conditions? And, even if it does, the grower is still interested in producing the maximum size of bunch in the shortest possible time for the least expenditure in materials and labour. Merely growing the plant is not enough.

The young, vigorous sucker with a large corm and narrow sword leaves is therefore preferred to other types of sucker for establishing the new plantation.

Padded waggon tested for bruising of cattle

By K. M. GRANT, Assistant Director of Veterinary Services.

Cattle travelling in a specially padded waggon suffered one per cent. less downgrading than cattle in waggons that were not padded.

Bruising of otherwise excellent carcasses causes a heavy loss of income to the producer because such cattle are downgraded and bring a lower return. It has been estimated that the yearly loss from bruising in cattle slaughtered in Queensland is £900,000, of which £700,000 would be from cattle slaughtered for export.

It has been further estimated, in a survey carried out by the Australian Meat Board, that about 10 per cent. of carcasses are downgraded from first quality purely because of bruising and that some 4-6 per cent. of bullocks and 12-16 per cent. of cows are rejected from export for a similar reason.

Apart from downgrading there is the actual loss of meat trimmed from the carcass. Taken over the 800,000 head killed for export at ruling prices this alone would represent an estimated loss of more than £200,000 per annum.

The present trend to quick-maturing chiller carcasses will increase the financial loss due to bruising. Such cattle are not only more liable to severe bruising, but they are intended to sell as a premium article, and any downgrading will reduce the price below an economic level.

Where does bruising of fat cattle occur? It occurs in mustering, drafting, yarding, holding, transporting, and handling operations, right up to the point of slaughter.

Yards are frequently badly designed, constructed and maintained. Gates are frequently too narrow and crushes too wide. Many cattle are bruised when the mob is hustled through gateways.

Careless shunting of rail waggons, undue delay on trucks, and hurried unloading are sources of bruises. Dehorning or tipping of cattle would avoid much bruising.

Undue use of dogs, "knocking boxes" holding more than one beast, and indiscriminate prodding with waddies can cause bruising at the works right to the point of slaughter.

Most severe bruising occurs on the loin, round and tail in the hindquarter, and on the rib and blade in the forequarter. Severe loin bruising is particularly objectionable since it is usually deep and resultant trimming affects the most valuable part of the carcass.

Although bruising due to rail waggons is only a fraction of total bruising, it was decided to ascertain how much it could be reduced by suitably padding the waggons.

An ordinary K waggon was selected and modified at the Ipswich railway workshops.

Rubber Bolster.

As observation had suggested that most bruises occurred at the doorways and by contact with the walls at hip height, both these factors were given attention. A long rubber bolster, 9 in. wide, was secured at a centre height of 3 ft. 9 in. This bolster ran right round the sides and both ends of the truck and was made of hard rubber with fabric reinforcement. The rubber curved out 3 in. from the wall and formed a hollow cushion at a height which would protect the hips, pin bones and ribs.

Cattle frequently jam their hips on the sides of the door openings when loading and unloading, so perpendicular, rubber-covered rollers were placed just inside, and parallel to, these openings.

The waggon was then put into service on the south-western line and cattle examined on arrival in Brisbane. Wherever possible the extent of downgrading for bruising of cattle carried in the padded truck and that of comparable cattle in the same trainload were compared after slaughter.

These comparisons showed an advantage in respect to the padded truck of 5 per cent. downgraded, as against 6 per cent. in unpadded trucks.

Although these figures were regarded as encouraging, it was not considered that the improvement made up for the high cost of installation (£180 per truck) and the slight reduction in carrying capacity of the truck caused by the projection of the bolster.

From these experiments it appears that major reduction in the bruising of slaughter cattle must come from careful attention to dehorning and general handling, as well as skilled design and careful maintenance of yards and crushes.

◆

Look After Your Diesel.

Watch these points and prolong the life of your diesel tractor:—

(1) Do not allow a diesel engine to "idle" for any length of time.

(2) Do not start from cold and "race" the engine or put it straight into heavy work. The diesel engine can take a load immediately it is started, but it should be allowed a little time for the lubricating oil to circulate to all parts of the engine. The bearing pressures of the diesel are greater than petrol or kerosene engines. To prevent bearing failures allow the engine to run steadily for a short spell without load.

(3) Do not neglect to strain the fuel carefully before it gets into the tractor tank.

(4) Do not neglect regular attention to fuel and air filters.

(5) Change sump oil after the allotted time of use. Drain sump when tractor is just in from work. Hot oil drains more easily.

(6) Do not operate a diesel tractor if one or more cylinders are not working properly. It may be an injector or a pump at fault. If attended to at once it may save a costly repair.

—*C. G. WRAGGE,*
Agricultural Engineer.

Tuberculosis-Free Cattle Herds. (As at 23rd December, 1958.)

Aberdeen Angus.

G. H. & H. J. Crothers, "Moorenbah," Dirranbandi
A. G. Elliott, "Ooraine," Dirranbandi
W. H. C. Mayne, "Gibraltar," Texas

A.I.S.

M. E. & E. Scott, "Wattlebrae" A.I.S. Stud, Kingaroy
F. B. Sullivan, "Fermanagh," Pittsworth
D. Sullivan, "Bantry" Stud, Rossvale, *via* Pittsworth
W. Henschell, "Yarranvale," Yarranlea
Con. O'Sullivan, "Navillus" Stud, Greenmount
H. V. Littleton, "Wongelea" Stud, Hillview, Crow's Nest
J. Phillips and Sons, "Sunny View," Benair, *via* Kingaroy
Sullivan Bros., "Valera" Stud, Pittsworth
Reushle Bros., "Reubydale" Stud, Ravensbourne
A. C. and C. R. Marquardt, "Cedar Valley," Wondai
A. H. Sokoll, "Sunny Crest" Stud, Wondai
W. and A. G. Scott, "Welena" A.I.S. Stud, Blackbutt
G. Sperling, "Kooravale" Stud, Kooralgin, *via* Cooyar
C. J. Schloss, "Shady Glen," Rocky Creek, Yarraman
W. H. Thompson, "Alfa Vale," Nanango
S. R. Moore, Sunnyside, West Wooroolin
H.M. State Farm, Numinbah
Edwards Bros., "Spring Valley" A.I.S. Stud, Kingaroy
D. G. Neale, "Grovely," Greenmount
A. W. Wieland, "Milhaven" A.I.S. Stud, Milford, *via* Boonah
W. D. Davis, "Wamba" Stud, Chinchilla
Queensland Agricultural High School and College, Lawes
C. K. Roche, Freestone, Warwick
Mrs. K. Henry, Greenmount
D. B. Green, "Deloraine" Stud, Durong, Proston
E. Evans, Wootha, Maleny
T. L. and L. M. J. Cox, "Seafield Farm," Wallumbilla
J. Crookey, "Arolla" A.I.S. Stud, Fairview, Allora
M. F. Power, "Barfield," Kapaldo
A. H. Webster, "Millievale," Derrymore
W. H. Sanderson, "Sunlit Farm," Mulgildie
R. A. and N. K. Shelton, "Vuegon" A.I.S. Stud, Hivesville, *via* Murgon
R. R. Radel & Sons, "Happy Valley," Coalstoun Lakes
C. A. Heading, "Wilga Plains," Maleny
G. S. and E. Mears, "Morden," M.S. 755, Toogoolawah

Ayrshire.

L. Holmes, "Benbecula," Yarranlea
J. N. Scott, "Auchen Eden," Camp Mountain
E. Mathie and Son, "Ainslie" Ayrshire Stud, Maleny
C. E. R. Dudgeon, "Marionville" Ayrshire Stud, Landsborough
G. F. H. Zerner, "Pineville," Pie Creek, Box 5, P.O., Gympie
T. F. Dunn, Alanbank, Gleneagle

Friesian.

C. H. Naumann, "Yarrabine" Stud, Yarraman
D. J. Pender, "Camelot," Lytton road, Lindum
S. E. G. Macdonald, "Freshfields," Marburg

Guernsey.

C. D. Holmes, "Springview," Yarraman
A. B. Fletcher, Cossart Vale, Boonah
W. H. Doss, Degilbo, *via* Biggenden
A. C. Swendson, Coolabunia, Box 26, Kingaroy
C. Scott, "Coralgrae," Din Din Road, Nanango
R. J. Wissemann, "Robnea," Headington Hill, Clifton
G. L. Johnson, "Old Cannindah," Monto
A. Ruge & Sons, Woowoonga, via Biggenden
G. Miller, Armagh Guernsey Stud, Armagh, M.S. 428, Grantham
N. H. Sanderson, "Glen Valley," Monto

Jersey.

Queensland Agricultural High School and College, Lawes
J. S. McCarthy, "Glen Erin" Jersey Stud, Greenmount
J. F. Lau, "Rosallen" Jersey Stud, Goombungee
G. Harley, Hopewell, M.S. 189, Kingaroy
Toowoomba Mental Hospital, Willowburn
Farm Home for Boys, Westbrook
P. J. L. Bygrave, "The Craigan Farm," Aspley
R. J. Crawford, "Inverlaw" Jersey Stud, Inverlaw, Kingaroy
P. H. F. Gregory, "Carlton," Rosevale, *via* Rosewood
E. A. Matthews, "Yarradale," Yarraman
A. L. Semgreen, "Tecoma," Coolabunia
L. E. Meier, "Ardath" Stud, Boonah
A. M. and L. J. Noone, "Winbirra" Stud, Mt. Esk Pocket, Esk
W. S. Conochie and Sons, "Brookland" Stud, Sherwood road, Sherwood
Estate of J. A. Scott, "Kiaora," Manumbar road, Nanango
F. W. Verrall, "Coleburn," Walloon
C. Beckingham, Trouts road, Everton Park
W. E. O. Meir and Son, "Kingsford" Stud, Alberton, *via* Yatala
G. H. Ralph, "Ryecombe," Ravensbourne
Mrs. I. L. M. Borchert, "Willowbank" Jersey Stud, Kingaroy
Weldon Bros., "Gleneden" Jersey Stud, Upper Yarraman
D. R. Hutton, "Bellgarth," Cunningham, *via* Warwick
J. W. Carpenter, Flagstone Creek, Helidon
H. G. Johnson, "Windsor" Jersey Stud, Beaudesert
W. S. Kirby, Tinana, Maryborough
S. A. Cramb, Bridge st., Wilsonton, *via* Toowoomba
J. A. & E. E. Smith, "Heatherlea" Jersey Stud, Chinchilla
W. C. M. Birt, "Pine Hill" Jersey Stud, Gundiah
T. Nock, Dallarnil
P. Fowler & Sons, "Northlea," Coalstoun Lakes
F. Porter, Conondale
H.M. State Farm, Palen Creek
B. T. Seymour, "Upwell" Jersey Stud, Mulgeldie

Poll Hereford.

W. Maller, "Boreview," Pickanjinnie
J. H. Anderson, "Inverary," Yandilla
D. R. and M. E. Hutton, "Bellgarth," Cunningham, *via* Warwick.
E. W. G. McCamley, Eulogie Park, Dululu
Wilson and McDouall, Calliope Station, Calliope

Poll Shorthorn.

W. Leonard & Sons. Welltown. Goondiwindi

Prevent Scours In Young Pigs

By G. W. OSBALDISTON,
Assistant Husbandry Officer.

Where there is a threat of scours in young pigs, prevention by good husbandry is better than cure.

A good strain of pigs should have no difficulty in reaching an average weaning weight of 40 lb. provided they receive good nutrition and husbandry. Thriving, healthy piglets at weaning usually have received no setbacks during their pre-weaning life. One of the more common setbacks encountered on pig farms in Queensland is scouring or diarrhoea and this condition is generally known as "the scours."

Both thrifty and unthrifty pigs can scour (Plate 1). However, it is the unthrifty piglet that is more severely affected. This scouring results in the already unthrifty or backward piglet falling away further. Healthy piglets may be able to withstand the condition and only lose a little of their bloom and vigour but, on the other hand, they may succumb and become unthrifty as the condition becomes more severe. For obvious reasons, healthy piglets have a much better chance of resisting the harmful effects of scouring. The first noticeable result of the scour is that the affected animal does not grow so well as the other piglets in the litter. Associated with this poor growth are loss of bloom, or a general unhealthy appearance, and loss of appetite.

The poor growth and unhealthy appearance are due to an upset in the nutrition of the piglet. Severely affected animals won't eat and so they starve. The effects of starvation are well known. However, less severely affected piglets will consume only a very small amount of sow's milk and creep food. Sick piglets—and piglets with scours must be regarded as sick animals—suffer loss of appetite and so live on an amount of food that is not sufficient for good growth. Secondly, the food consumed is not so efficiently digested as it is by a healthy piglet and the combination of insufficient food and inadequate digestion means that the piglet is living on a very low nutritional plane—in fact, starvation rations! As a result of this, poor weight gains and even weight loss may result.

POINT OF NO RETURN.

As the scour develops in intensity, the cost of treatment may be uneconomical. This is shown in the diagram as the "economic point of no return."

If the cause of the scour is not eliminated, the condition will become more severe and terminate with death. Death is due to pathogenic or harmful bacteria in the more acute cases, and with the more protracted cases it is generally due to starvation.

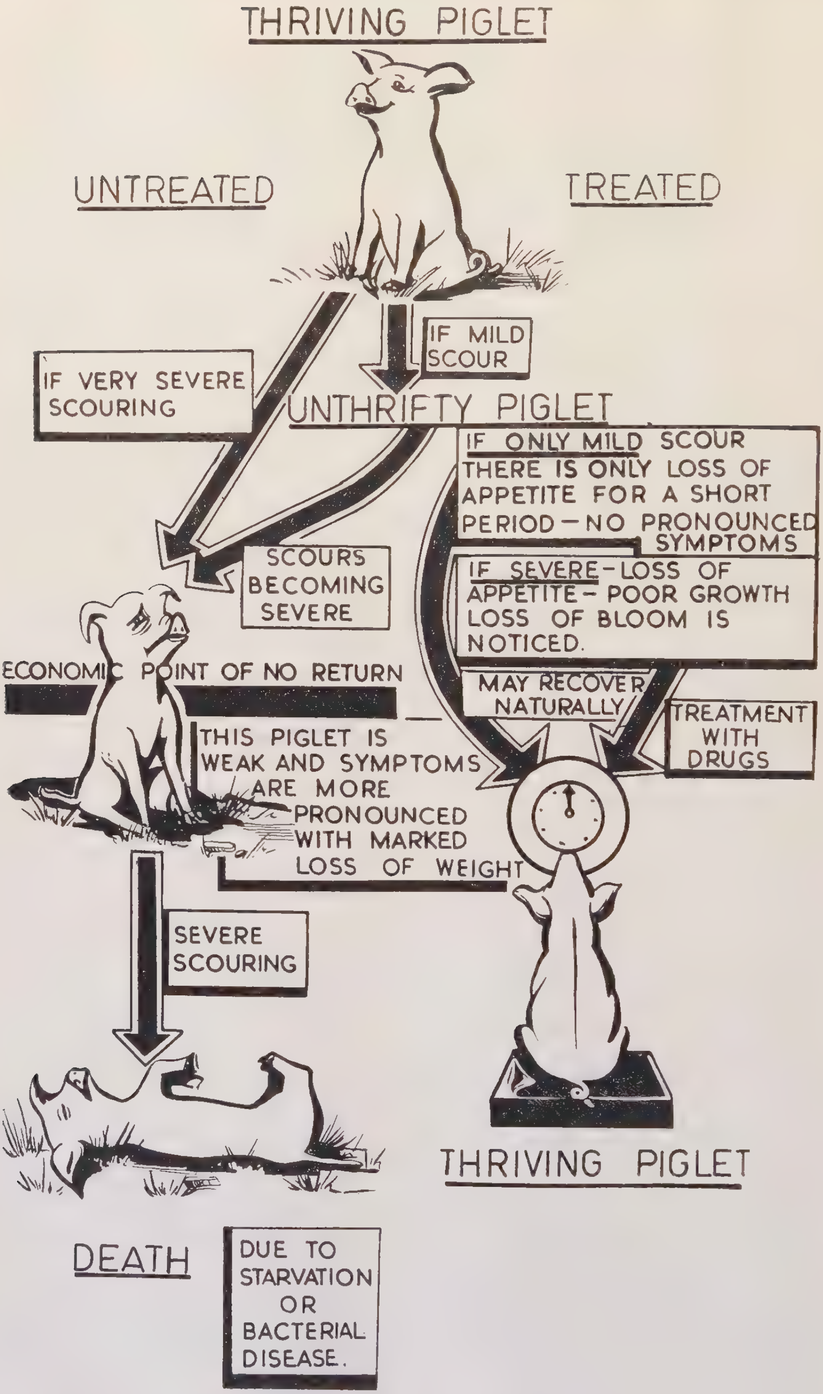

THRIVING PIGLET
UNTREATED
TREATED
IF VERY SEVERE SCOURING
IF MILD SCOUR
UNTHRIFTY PIGLET
IF ONLY MILD SCOUR THERE IS ONLY LOSS OF APPETITE FOR A SHORT PERIOD — NO PRONOUNCED SYMPTOMS
SCOURS BECOMING SEVERE
IF SEVERE — LOSS OF APPETITE — POOR GROWTH LOSS OF BLOOM IS NOTICED.
ECONOMIC POINT OF NO RETURN
MAY RECOVER NATURALLY
TREATMENT WITH DRUGS
THIS PIGLET IS WEAK AND SYMPTOMS ARE MORE PRONOUNCED WITH MARKED LOSS OF WEIGHT
SEVERE SCOURING
THRIVING PIGLET
DEATH
DUE TO STARVATION OR BACTERIAL DISEASE.

Plate 1.

Diagram Showing Treated and Untreated Scouring in Piglets.

THE CAUSES OF SCOURS.

The causes of scours may be classified broadly into three groups:

(*a*) Filth-borne infections;

(*b*) Nutritional disorders;

(*c*) Factors affecting the general well-being of the animal.

The common cause of scours is considered to be filth-borne infections, and when an outbreak occurs in suckling pigs, it is usually a signal that the general sanitation within the piggery is at a low standard. The sleeping quarters, feeding equipment or the ground itself may be the source of the trouble.

Feeding equipment is more likely to get filthy where milk and liquids are fed with meal in troughs. Should the food not be cleaned up completely, the remaining food forms an ideal site for bacteria to grow and multiply. This thriving colony of bacteria may be ingested at a later meal by the piglet and once the bacteria have gained entrance to the stomach, they cause a disease of which scouring is the important symptom.

The sleeping quarters and the ground may become fouled with dung and urine if the body waste products are not frequently removed from the pen. Filthy, insanitary pens are ideal sites for scour-causing bacteria to grow. A piggery with a history of most litters suffering from "the scours" is almost always one with a poor sanitation standard.

The prevention of filth-borne infections requires a high level of sanitation and hygiene. To improve the sanitation may require an alteration in the management programme and an improvement of the accommodation at the piggery.

The management programme should include a daily cleaning of the farrowing pens, the sow and litter pens, and the feeding equipment. Bedding should be removed when soiled and replaced with clean dry material.

The improvement of the accommodation is, in practice, only an aid to the management programme. To make cleaning easier, small pens with a hard, smooth, durable surface would be ideal. Feeding troughs with no corners or cracks, that could harbour uneaten meal, and which may be easily cleansed would be satisfactory. Self-feeding of dry meals will ensure these conditions.

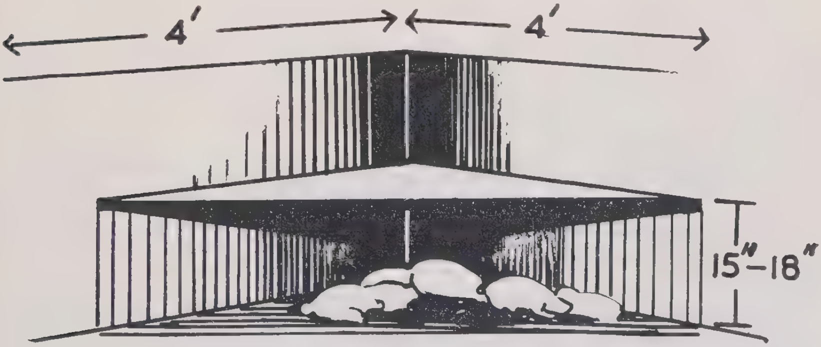


Plate 2.

The Hover Board Provides Warmth for Piglets in One Corner of a Farrowing Pen.

It is best to supply water in small automatic-type waterers which do not spill or overflow and so there is no possibility of a quagmire developing in the pig run.

The design of the piggery should be such that each pen is individually drained.

NUTRITIONAL DISORDERS.

These may take the form of a deficiency in the diet, or a digestive disorder.

The nutritional deficiency most likely to cause sucking piglets to scour is a lack of iron in the diet. The piglet uses iron in the formation of haemoglobin, which is the main constituent of red blood cells. In other words, iron helps in the formation of blood. When a deficiency of iron occurs, the blood-forming organs have not sufficient of the raw material to form blood and so the piglet suffers from anaemia or lack of red blood cells.

Most pig breeders refer to this condition as piglet anaemia.

The condition arises because the sow's milk is naturally lacking in iron and so after 5 or 6 days of life the piglets may start to show symptoms of deficiency.

Observations show that at the fifth or sixth day piglets, if running outside, will start to nose around the ground and food troughs, and so lick up soil and other material. The piglets get sufficient iron from the nosings in the soil to meet their requirements and so this deficiency is generally overcome. If no additional iron is available, as when piglets are confined in concrete sties, piglet anaemia becomes apparent.

The symptom of piglet anaemia is a white scour which may be liquid or of a pasty consistency, and it is generally found in piglets 1 to 3 weeks old which have been reared other than in dirt pens. It can occur where piglets run on dirt but is much more frequent in intensive piggeries.

Prevention can take many forms, but one method is to allow the sow and litter a short period at parasite-free pasture daily when the litter is 5 to 7 days old. A second method is to supply the iron in the pen in the form of the chemical ferrous sulphate. The common technique is to scatter a small handful of ferrous sulphate over the floor of the pen.

Some farmers place a clod of clean dirt in the pen, that is, dirt which is not likely to have any roundworm eggs, and allow the piglets to get their iron requirements from nosing in the dirt.

The fourth method is to administer the iron into the mouth of the pig. This is considered the most satisfactory method as the farmer knows each pig has received its dose of iron. A small volume, usually 1 cc., of a saturated solution of iron and ammonium citrate placed on the tongue of the young piglet at five days is the recommended procedure. Some farmers prefer to inject the iron into the body cavity of the piglet. This practice is quite common in England where a compound of iron and dextrose is used.

Digestive disorders arise from faulty sow and litter management. The common faults are:—

(1.) Sudden overfeeding or a sow that has a weak, unthrifty litter;

(2.) Allowing starving piglets access to lush pasture;

(3.) Sudden alteration of the composition of the piglet's feed.

Sudden overfeeding of the sow will cause a milk flush and consequently the piglets gorge the sow's milk and suffer digestive upsets. Lush pasture, when consumed in excess quantities, will produce a green coloured scour.

Moving the sow and litter to succulent pasture and continuing the sow on a full ration has also been observed to encourage the trouble, particularly when the ration contains liberal amounts of skim-milk, butter-milk or whey. Any sudden alteration in the protein level or change in the type of protein in a creep feed may produce a scour. This scour is particularly common where farmers wean piglets earlier than 8 weeks.

To prevent a scour of nutritional origin, practise good husbandry and make any dietary alterations gradually. The nutritional scour is not serious usually and it is best treated by reducing the food intake of the piglets. For example, if the piglet is suckling, reduce the food intake of the sow temporarily so that she will not produce her normal volume of milk or if the piglets are eating meal make the meal available only in restricted quantity.

All scours of this nature need to be diagnosed and treated immediately, as a sequel to the untreated scour may be the invasion of pathogenic bacteria due to the lowered resistance of the scouring animal.

GENERAL WELL-BEING.

The factors affecting the well-being of the piglet are generally associated with housing. It is well recognised that cold, damp or draughty sleeping quarters are prone to produce scours. Scours of this nature are not seasonal as they can occur in either summer or winter.

Where accommodation is the trouble, most litters are affected and a typical farm history with this problem is the continual occurrence of mild scours when piglets are a few weeks old. To prevent this problem, improvements or alteration to the farrowing pens are necessary.

The mere provision of bedding is not sufficient to ensure a warm bed. Obviously to prevent chilling, piglets must have a warm floor and a warm environment. It is shown by field records that the warmest floor is a hollow concrete one. Details of the construction of this floor can be obtained from any Department of Agriculture and Stock Office. To provide warm surroundings, two methods are suggested. The first method is to construct a shelf 15 to 18 in. above the ground in one corner of the farrowing pen. This is known as a hover board. The dimensions are shown in Plate 2.

The underside of the hover board should have a reflecting surface so that the heat generated by the piglets' bodies is reflected back onto them. Aluminium foil has good reflecting properties.

The second method is to make a "snuggery." This is made of 6 bales of straw so arranged that they form an igloo. Both methods depend on retaining the heat generated by the piglets' bodies.

TREATMENT.

The use of drugs for the treatment of scours will be outlined in another issue. However powerful the drugs used, treatment remains an emergency measure of temporary benefit. Prevention by good housing and husbandry is better than cure.

1957 Index Now Ready.

The index to the Queensland Agricultural Journal for 1957 (*Vol.* 83) *is available now and may be had on application to the Under Secretary, Department of Agriculture and Stock, Brisbane.*

Brucellosis-Tested Swine Herds

(As at 23rd December, 1958.)

Berkshire.

S. Cochrane, "Stanroy" Stud, Felton
J. L. Handley, "Meadow Vale" Stud, Lockyer
O'Brien and Hickey, "Kildurham" Stud, Jandowae East
G. C. Traves, "Wynwood" Stud, Oakey
Westbrook Farm Home for Boys, Westbrook
H.M. State Farm, "Palen" Stud, Palen Creek
A. R. Ludwig and Sons, "Beau View" Stud, Beaudesert
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
R. H. Crawley, "Rockthorpe" Stud, *via* Pittsworth
F. R. J. Cook, Middle Creek, Pomona
Mrs. I. M. James, "Kenmore" Stud, Cambooya
H. L. Stark, "Florida," Kalbar
H.M. State Farm, Numinbah
G. L. Gabanko and R. H. Atkins, "Diamond Valley" Stud, Mooloolah
L. Puschmann, "Tayfeld" Stud, Taylor
C. E. Edwards, "Spring Valley" Stud, Kingaroy
V. F. Weier, "La Crescent," Clifton
N. Rosenberger, "Nevrose," Wyreema
L. P. Orange, "Hillview," Flagstone Creek
B. Osborne and Dr. J. W. Best, Miltown Stud Piggery, Warwick
W. Young, Kybong, via Gympie
E. J. Clarke, Mt. Alford, *via* Boonah
G. McLennan, "Murcott" Stud, Willowvale
C. F. W. and B. A. Shellback, "Redvilla" Stud, Kingaroy
J. C. Lees, "Bridge View" Stud, Yandina
F. Thomas, "Rosevale" Stud, M.S. 373, Beaudesert
A. C. Fletcher, "Myola" Stud, Jimbour
Q.A.H.S. and College, Lawes
E. F. Smythe, "Grandmere" Stud, Manyung, Murgon
E. R. Kimber, Block 11, Mundubbera
A. J. Potter, "Woodlands," Inglewood
Regional Experiment Station, Hermitage
J. W. Bukowski, "Secreto" Stud, Oxley
R. Astbury, "Rangvilla," Pechey
L. Pick, Mulgildie
D. G. Grayson, Killarney
A. French, "Wilson Park," Pittsworth
P. L. Pfrunder, Pozieres

Large White.

H. J. Franke and Sons, "Delvue" Stud, Cawdor
Garrawin Stud Farm Pty. Ltd., 657 Sandgate road, Clayfield
J. A. Heading, "Highfields," Murgon
R. Postle, "Yarralla" Stud, Pittsworth
B. J. Jensen, "Bremerside" Stud, Rosevale, *via* Rosewood.
E. J. Bell, "Dorne" Stud, Chinchilla
L. C. Lobegeiger, "Bremer Valley" Stud, Moorang, *via* Rosewood.
H. R. Gibson, "Thistleton" Stud, Maleny
H.M. State Farm, Numinbah
V. P. McGoldrick, "Fairymeadow" Stud, Cooroy
S. T. Fowler, "Kenstan" Stud, Pittsworth
W. Zahnow, Rosevale, *via* Rosewood
Regional Experiment Station, Biloela
G. J. Hutton, "Grajea" Stud, Cabarlah
H. L. Larsen, "Oakway," Kingaroy
A. Palmer, "Remlap," Greenmount
G. I. Skyring, "Bellwood" Stud, *via* Pomona
G. Pampling, Watch Box road, Goomeri
M. Hall, "Milena" Stud, D'Aguilar
K. B. Jones, "Cefn" Stud, Pilton road, Clifton
Barron Bros., "Chiltern Hill," Cooyar
K. F. Stumer, French's Creek, Boonah
Q.A.H.S. and College, Lawes
R. S. Powell, "Kybong" Stud, Kybong, *via* Gympie
C. Wharton, "Central Burnett" Stud, Gayndah
S. Jensen, Rosevale, *via* Rosewood
V. V. Radel, Coalstoun Lakes
H. R. Stanton, Tansey, *via* Goomeri
L. Stewart, Mulgowie, *via* Laidley
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
O. J. Horton, "Manneum Brae" Stud, Manneum, Kingaroy
Dr. B. J. Butcher and A. J. Parnwell, 684 Logan road, Greenslopes, Brisbane
R. Kennard, Collar Stud, Warwick
A. C. H. Gibbons, Mt. Glorious
A. Kanowski, "Exton," Pechey
L. C. and E. Wieland, Lower Cressbrook
P. L. and M. T. D. Hansen, "Regal" Stud, Oaklands, Rangeville, Toowoomba.
J. C. Lees, "Bridge View" Stud, Yandina
R. Rhodie, Clifton
C. Assenbruck, Mundubbera
A. J. Mack, Mundubbera
J & S. Kahler, East Nanango
C. P. Duncan, "Hillview," Flagstone Creek

Tamworth.

D. F. L. Skerman, "Waverley" Stud, Kaimkillenbun
A. C. Fletcher, "Myola" Stud, Jimbour
Salvation Army Home for Boys, "Canaan" Stud, Riverview
Department of Agriculture and Stock, Regional Experiment Station, Kairi
F. N. Hales, Kerry road, Beaudesert
T. A. Stephen, "Withcott," Helidon
W. F. Kajewski, "Glenroy" Stud, Glencoe
A. Herbst, "Hillbanside" Stud, Bahr Scrub, *via* Beenleigh
F. Thomas, "Rosevale" Stud, M. S. 373, Beaudesert
H. J. Armstrong, "Alhambra," Crownthorpe, Murgon
R. H. Coller, Tallegalla, *via* Rosewood
D. V. and P. V. Campbell, "Lawn Hill," Lamington
S. Kanowski, "Miecho" Stud, Pinelands
N. R. Potter, "Actonvale" Stud, Wellcamp
L. C. and E. Wieland, Lower Cressbrook
J. D. Booth, Swan Ck., Warwick

Wessex Saddleback.

W. S. Douglas, "Greylight" Stud, Goombungee
C. R. Smith, "Belton Park" Stud, Nara
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
J. B. Dunlop, "Kurrawyn" Stud, Acacia road, Kuraby
M. Nielsen, "Cressbrook" Stud, Goomburra
G. J. Cooper, "Cedar Glen" Stud, Yarraman
"Wattledale" Stud, 492 Beenleigh road, Sunnybank
Kruger and Sons, "Greyhurst," Goombungee
A. Scott, "Wanstead" Stud, Grantham
G. C. Burnett, "Rathburnie," Linville
A. J. Mack, Mundubbera
J. Ashwell, "Greenhill," Felton South

Large Black.

E. Pointon, Goomburra

Dr. Hammond's Talk On Pigmeat

**By F. H. D. MARSHALL, Technical Officer,
Division of Animal Industry.**

In the introductory remarks to that portion of his public lecture concerned with production of pigmeat, Dr. John Hammond, the world authority on animal husbandry, said that in pig carcasses as with cattle, the cuts from the back and hindquarters were in greatest demand and thus brought the best prices.

Plate 1, he said, depicted the way in which pigs changed in shape or conformation as they grew older. The English Large White pig shown on the

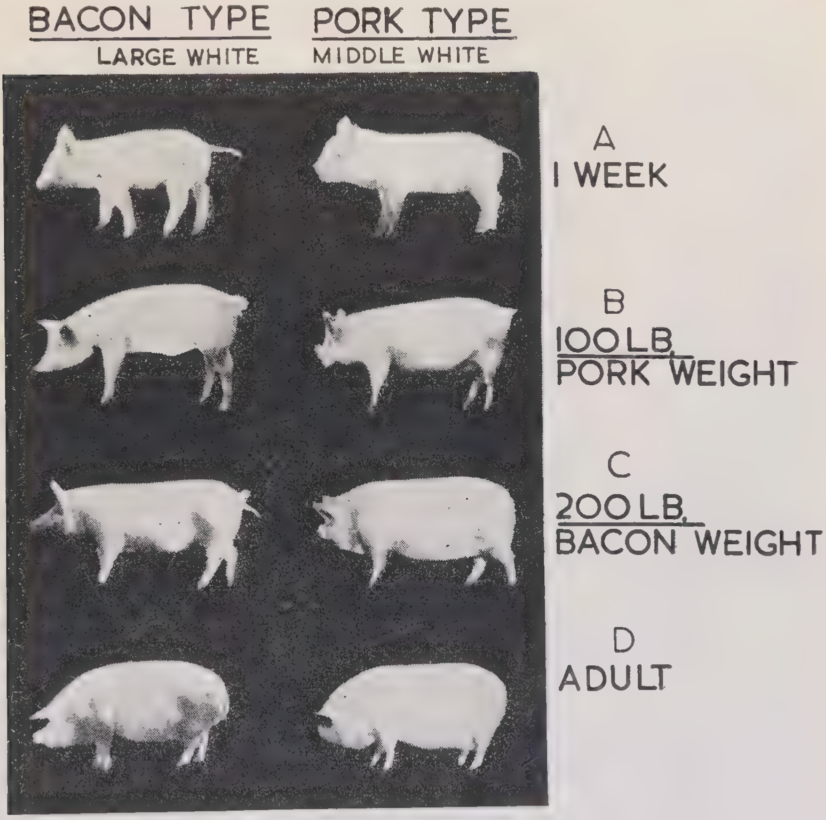

BACON TYPE
LARGE WHITE
PORK TYPE
MIDDLE WHITE
A
I WEEK
B
100 LB.
PORK WEIGHT
C
200 LB.
BACON WEIGHT
D
ADULT

Plate 1.

The Way Pigs Change in Shape or Conformation as They Grow Older.

left of the illustration was a late-maturing type whereas the Middle White pig on the right was an earlier-maturing animal. The body of the Large White pig lengthened out during the first stage of its growth (plate 1B), in the early period of which there was a high proportion of bone to meat. Its body then commenced to deepen through the ribs and at this point in its development it was slaughtered for bacon at about 200 lb. liveweight (plate 1C). If carried on beyond this stage its body grew deeper until the adult pig assumed the undesirable conformation shown in plate 1D.

The early-maturing type of pig, continued Dr. Hammond, was a relatively shorter pig and its body commenced to deepen at about 100 lb. liveweight. This was the right weight at which to slaughter this type of pig for pork. If allowed to grow to 200 lb. it would then be too deep and there would be too much low-priced meat on the carcass to make it profitable as bacon.

When farmers had pigs of mixed types, said Dr. Hammond, they should pick out the short ones when about 100 lb. weight and sell them for pork, keeping the longer pigs to rear as baconers. In this way the producer would get the best return from both markets.

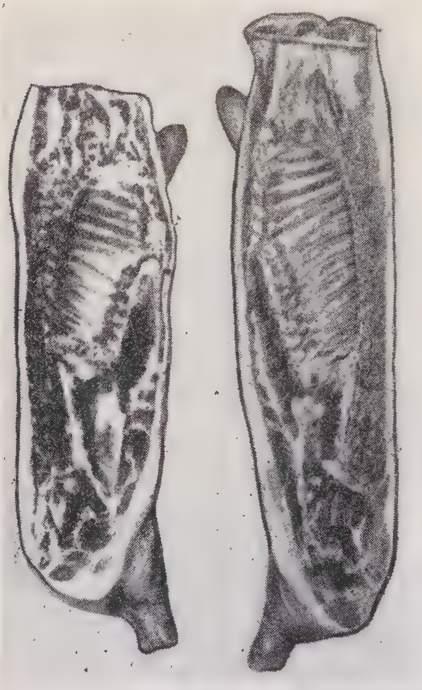


Plate 2.

Left: **Champion Bacon Carcass exhibited at Peterborough Competition in 1932.** Right: **The Champion Bacon Carcass in 1951.** To give a basis of comparison, the size of each side has been adjusted to a uniform shoulder measurement.

LENGTH IN BACONER.

Referring to Plate 2, Dr. Hammond said the two sides of bacon shown had the same amount of back fat and were of the same carcass weight. From the consumers' point of view they were both good bacon. However, the illustration clearly showed the modern trend toward the longer, leaner carcass, which had a larger proportion of the higher-priced cuts.

Danish competition, he said, had been severely felt by English producers. Danish sides were longer and retailers preferred them because they cut more high-priced back rashers than the shorter English carcass, which had more of the cheaper belly rashers for which there was less demand. To encourage home producers to grow the longer type of pig required, English grading standards had been altered to include a measurement for length of carcass as well as for back fat.

Plate 3, said Dr. Hammond, was a series of sketches intended to show the change that had taken place in the pig's shape as the result of the work of breeders in "shifting" the weight in the carcass from the less valuable forequarters to the more valuable hindquarters. The top illustration depicted the wild boar with 70 per cent. of its weight in the fore-end of its body. The middle sketch was typical of the present day Argentine pig with weight distribution about 50-50, and the bottom drawing showed the type of pig that breeders were aiming at, with only 30 per cent. of its weight in the forequarters and 70 per cent. in the back and rear end.

FEEDING METHODS.

In dealing with pig-feeding methods in England, Dr. Hammond traced briefly the development of pigmeats in that country since the end of the war. At that time, he said, beef supplies from the Argentine were difficult to obtain and while re-establishing the home-grown beef industry (as outlined in last month's issue) the nation was fed mainly on pork.

Because of the demand for meat, no quality payment was made to producers, with the result that pork carcasses became excessively fat.

After a period of about three years, when beef began to make its appearance on the home market in increasing quantities, buyer-resistance developed towards overfat pigmeat. Grading of carcasses, as practised before the war, was then re-introduced and it was remarkable, said Dr. Hammond, how quickly the quality of carcasses improved.

This change was not due to breeding but almost solely to improved methods of feeding.

FEED YOUNG PIGS.

Plate 4 showed two pigs reared in a feeding experiment to test the value of low-high and high-low levels of nutrition. In this trial, said Dr. Hammond, a litter of pigs was divided in halves. One half was poorly fed for 16 weeks, while the other half was well fed. The top pig was from the latter group and the lower pig from the poorly fed group. At the end of 16 weeks the poorly fed group was placed on a high level of feed till their weight reached 200 lb. liveweight. At the same time the well-fed group was rationed so that their growth was slowed down to enable them to reach that weight about the same time as the poorly fed group.

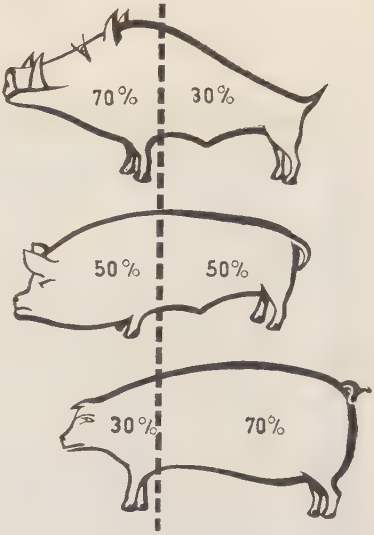


Plate 3.

Change in the Shape of Pigs Due to Breeding.

This treatment resulted in two groups of pigs of the same age and body weight yet with very different conformations. The pigs which had been well fed at the start made good length and muscle growth and when rationed continued this growth rather than put on fat. On the other hand,

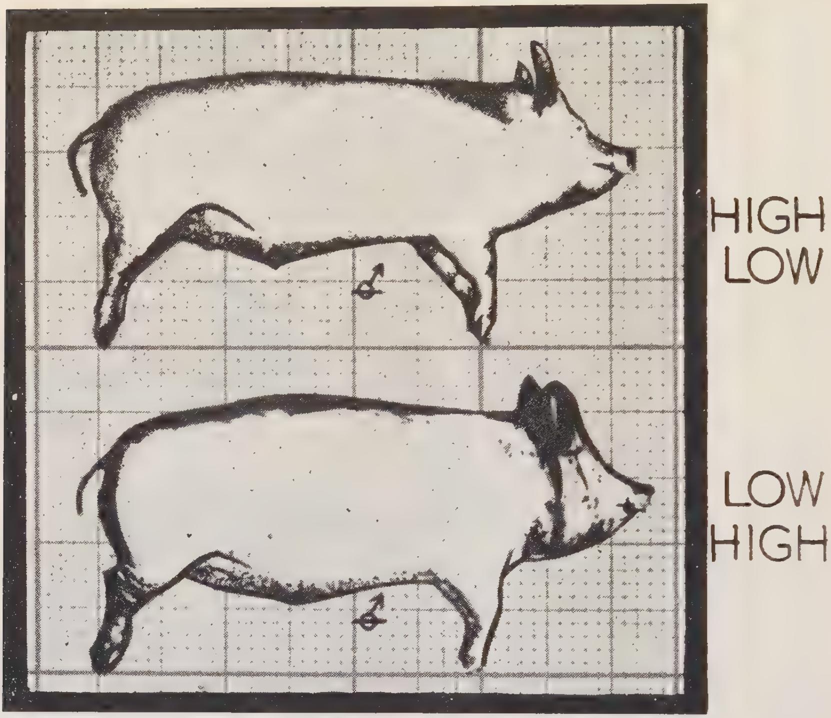


Plate 4.

Two Pigs Reared in a Feeding Experiment to Test the Value of Low-High and High-Low Levels of Nutrition.

the poorly fed pigs had a stunted frame and when well fed at a later stage quickly developed the "middle age spread" and were short and deep in the body.

The carcasses of the high-low ration group had a high proportion of muscle to fat but those of the low-high group were excessively fat. With the wider adoption of this high-low system of feeding in England the percentage of "A" grade carcasses improved, in the year following the re-introduction of grading, from 46 per cent. to 65 per cent. of the kill.

WEANING WEIGHTS.

Dr. Hammond said that Danish competition was compelling English pig producers to improve the feed efficiency of their animals. Pig Recording Societies had been started and information obtained by these bodies from farmers included: Average number of piglets born alive and dead (figures so far range from 6·5 to 11·9 live piglets per litter); average number of pigs and their weights at three weeks (so far, 12 lb. to over 14 lb.); average number of pigs and their weights at 8 weeks, which was really a measurement of the efficiency of creep feeding and housing under English conditions (weights varied from 25 to 42.8 lb.). This weaning weight was very important, said Dr. Hammond, as a high weight at this time was associated with length of carcass. When the weaning weight was low the carcass tended to be short and to produce low quality bacon.

The top set of figures in Table 1, said Dr. Hammond, showed the results of grading a number of pig carcasses in one experiment and bore out the statement that when weaning weights were high more "A" grade carcasses were produced. The lower figures illustrated the difference in weaning weights and grade quality between the offspring of two different boars—the offspring having been fed upon the same ration.

PROGENY TESTING.

About 70 per cent. of the cost of producing a bacon pig in England, said Dr. Hammond, was the cost of feed, and home producers were trying to breed pigs, which would convert feed into meat more efficiently. Five progeny testing stations had been established in England, each of which held 400 pigs and had an annual through-put of 800.

Breeders sent to the station four pigs from each of a number of different litters by the same boar and the sire was tested by the performance of his progeny. The efficiency of live weight gain from 50 lb. to 200 lb. showed great variation between offspring of different boars, varying in some recent trials from 3.2 lb. to well over 4 lb. of feed consumed for each pound of body weight gained.

Carcass quality of the progeny was also measured and this information assisted in evaluating the worth of boars undergoing test.

By the use of artificial insemination, said Dr. Hammond, it was hoped to make much more profitable use of the superior boars discovered through this system of testing, by spreading their potentiality for efficiency of feed conversion and rapid growth through the industry.

QUEENSLAND'S PIG TESTING STATION.

Dr. Hammond said he had inspected the Pig Testing Station recently established by the Queensland Department of Agriculture and Stock at its Animal Husbandry Research Farm at Rocklea and felt certain that it would make a valuable contribution to pig raising in Queensland.

TABLE 1.

——	Average Weight (lb.) at 8 Weeks Old.	Back Fat Grade — %.			Number of Pigs.
		A	C	D	
	20–29	49	33	18	57
	30–34	61	34	5	83
	35–45	82	18	0	33
Offspring of Boar X 30 lb.		49	40	11	82
Offspring of Boar Y 33 lb.		68	28	4	47

Safety on Farms

The accidents which frequently occur not only on Queensland farms, but on farms all over the world are due to many causes, among which are unprotected parts of running machinery, and carelessness of both experienced and inexperienced operators and their ignorance of the dangerous possibilities.

In an attempt to avert the fatal tragedies that occur to tractor drivers, the following 15 golden rules have been classified into two simple groups, namely DO and DON'T. Each tractor driver should be as familiar with each one of them as he is with his own name.

This is what every tractor driver should DO:

1. Lock brake pedals together when driving in high gear, as for example on roadways.

2. Slow down before taking a turn.

3. Drive slowly over rough ground and across drains.

4. Beware of potholes on hillsides.

5. Be careful in turning UPHILL on a slope with an unloaded tractor travelling at speed—it is easy to tip over.

6. Similarly, be careful turning DOWNHILL on a slope with a loaded tractor.

7. Always check the seat and see it is safe.

Now this is what you DON'T do:

1. Dismount when the tractor is moving.

2. Fail to stop the PTO before dismounting.

3. Ride on the drawbar or drawn implement.

4. Forget to engage the gears when descending steep hills.

5. Refuel when the engine is running or extremely hot.

6. In coupling implements, fail to back with care. (Stop about 1 ft. to 2 ft. from the implement—throttle down very low and ease back slowly, keeping the foot on the clutch. Anyone assisting you should be on the alert to get away.)

7. Wear loose clothing which is liable to get caught in moving parts such as the PTO.

8. Let your children ride on the tractor. Wait until they are strong enough, old enough and, above all, wise enough to handle it themselves.

—*C. G. WRAGGE,*
Agricultural Engineer.

Stock Gazette

SPRAYING pasture with a tallow and detergent emulsion reduces the constant risk of bloat when cattle are grazed on clover or lucerne pastures. From every point of view, this is the most practical method yet of controlling bloat—it's effective, the cost is low and the spraying schedule can be fitted readily into the farm programme.

Sufficient emulsion is sprayed on the pasture to give each cow 2 to 3 oz. of tallow a day. The spray material costs about 2d. a cow a day. The emulsion is sprayed on the pasture with a boom spray, usually one day ahead of grazing. This is because cattle take more readily to pasture treated the previous day than they do to freshly treated pasture.

If bloat is a problem on your farm, ask your district Cattle Husbandry Adviser for information on mixing the spray and the quantity you'll need for your herd.

—*A. HUTCHINGS,*
Senior Cattle Husbandry Adviser.

NO one will dispute the fact that the housewife likes her eggs to be spotlessly clean and it's much better to produce them that way than to depend on cleaning.

Dirt is loaded with bacteria and moulds. In the presence of moisture these organisms penetrate the shell and having done so are sure to cause spoilage.

The egg has two lines of defence; a physical defence provided by the "bloom" on the outer surface of the shell and the shell membranes just inside the shell, and a biochemical defence due to the presence of a protein known as "globulin G1" in the white of the egg. The latter has the remarkable power of killing and dissolving these micro-organisms which gain entry to egg white.

Let's consider what happens when eggs are washed! The physical action of washing, whilst removing the dirt visible to the naked eye, also removes the "bloom"—and so opens up the first line of defence.

The action of washing has also spread micro-organisms practically all over the shell. Like a successful army invading in strength, penetration may be made at many points on the shell and the inner defence mechanism can't cope with the invasion. That the egg puts up a good battle against bacterial invasion is borne out by the fact that "rots" and "moulds" don't show up immediately; it may take days for this to happen.

This is the hard part because by this time it could have found its way from the farmer, through the Egg Marketing Board, out to the shopkeeper, and then to the housewife.

Let's be practical and admit that a few eggs inevitably become soiled and must be cleaned. It's proved more satisfactory to "dry clean" them with a piece of steel wool. Admittedly it's slower but it's a lot safer!

—*F. N. J. MILNE,*
Senior Poultry Husbandry Officer.

TIMELY TIPS FOR FEBRUARY.

All the hot months and especially February are the times to beware of arsenical poisoning. Over 50 per cent. of dip owners in Queensland still use arsenic to kill ticks. Remember its always a potential danger to stock wherever it's used.

Be scrupulous about cleanliness in the bails and milking machines. The hot, humid weather we normally expect in February favours the growth of bacteria. Cleanliness will go a long way towards keeping mastitis down.

Paratyphoid may crop up this month. Sudden deaths from this can be disastrous in pigs of any age. It is caused by germs called salmonella.

Salmonellosis can take a chronic form, causing profuse, watery, green scour and loss of condition over a period. A reasonable standard of cleanliness in the piggery, especially the food and water troughs, will help prevent both.

If an outbreak does occur prompt treatment pays off. Your veterinary surgeon will advise you on which form of treatment suits you best.

Warmth and moisture also favour the spread of leptospirosis in calves. Watch for " red water," sudden deaths and high temperature. (You need a thermometer.—The Department has a pamphlet on how to read one, if you don't know already).

◆

Kikuyu Under Irrigation

"A.R.," of Moura, has inquired about the use and suitability of Kikuyu grass in irrigated pastures on sandy loams in associations with H1 Rye grass and White or Ladino clovers.

Answer: There is little first hand knowledge of the performance of Kikuyu grass under irrigation except for a few small areas at Maleny where the grass is doing well under rainfall conditions. The grass is growing there on a deep red loam.

At the Irrigation Station at Gatton, Kikuyu grass performed disappointingly on the heavy soils and in addition it suffered severely from frosting.

On the sandy loams "A.R." proposes to use, Kikuyu grass may perform satisfactorily though frosts will still constitute a serious hazard.

Kikuyu grass in its natural habitat grows on deep friable soils at high altitudes. In Queensland where the conditions are similar the grass performs well. The deep friable soils permit the underground rhizomes to penetrate deeply in some cases up to 2 to 3 feet. Where the rhizomes are restricted by soil types these growths are replaced by surface runners or stolons which are confined to the ground's surface and consequently the grass does not develop or produce as well as the more favourable soil types.

On sandy loams, the rhizomes may penetrate well and so aid a good growth of grass; however, frosts will still constitute a hazard in "A.R's" case. A small trial area would be worth while to determine the performance of the grass under the local conditions.

Kikuyu grass produces a thick sward which would make the establishment of H1 rye grass a difficult matter in a pasture containing Kikuyu. In order to establish a good stand of white clover in Kikuyu grass it is necessary to carry out preparatory cultivation and thinning of the stand prior to sowing the clover. This must be followed by careful management and frequent renovations in order to maintain the white or ladino clovers in the Kikuyu grass pastures so treated.

Plate 1.—Tabbagong Victory With Some of His 47 Daughters. These cows had an average mature production of 358 lb. of butterfat.

How Good Is Your Dairy Bull?

By C. H. CLARK, Adviser, Division of Dairying.

MANY of today's dairymen are not content to make guesses at the value of their dairy bulls; they rely on herd recording to provide unbiassed assessments.

Sire surveying is one of the most important phases of herd recording. It allows farmers to assess the value of their herd sire as soon as his first daughters complete a recorded lactation. With this knowledge, they are then in a position to decide whether to keep or dispose of him.

In a herd of 30 cows, approximately 12 to 15 heifer calves would be sired by the average bull each year. As most bulls have a working life of at least three years it follows that they would sire 35 to 45 heifer calves while they are being used. On the other hand only two or three heifer calves would be available from any one cow during her lifetime. Therefore, on the average, the bull is about 16 times more important than any cow in the herd in determining the quality of animals available for replacements.

As half the hereditary make-up of each daughter is derived from the bull, he will exert a big influence on the productive ability of these animals. A sire survey indicates the production qualities a bull is actually transmitting to his daughters. As soon as they become herd replacements their sire will determine to a large extent the quality of the future herd.

It has been shown that an average pure-bred bull will raise the yield of a low-producing herd. However, where the herd production is low, feeding and management are probably the most important factors in raising the level. When herd production is above the average, the quality of the herd sire plays an increasingly important part in determining the future level of production.

Thus any man with a better-than-average herd should keep a close watch on the production capabilities of his bulls by continually using the results of sire survey. This means that the capabilities of the bulls are being measured on the performance of their progeny.

Method of Surveys.

A sire survey is carried out by tabulating the production records of a bull's daughters according to age, and then calculating the average production of each age group. This figure is compared with the average production of other animals in the herd which are in the same age group—that is, the average production of the two-year-old daughters of a bull is compared with the average production of other two-year-old animals in the herd. Comparisons are made according to the year in which the lactations were completed.

The average production of the two-year-old and three-year-old daughters of the bull is also corrected to a figure equivalent to their production as mature cows. This figure is commonly known as the "maturity equivalent" production of these progeny. It is averaged with the production of any other daughters (that is, four- and five-year-olds) of the bull. This enables a comparison of a bull's daughters with other mature cows in the herd.

In order to get a true picture of a bull's capacity to transmit high or low production qualities, a survey must embrace as many daughters as possible or at least the first 10 daughters which have completed a lactation. Overseas research has shown that the herd sire will transmit his production characteristics to his first daughters equally as well as to those in later years.

Conditions of Surveys.

The owners of bulls used in recorded herds may make applications for sire surveys each year. Application forms are forwarded to members of the group recording scheme at the end of each recording year. An endeavour is made to complete surveys as soon as possible after the end of that period.

The dairy sire survey service has been formulated according to the following conditions:—

(1) All requests for a sire survey must be made on a form which is obtainable from the Director of Dairying. (Requests should preferably be made at the beginning of the recording year.)

(2) The applicant must undertake to supply all the particulars required. (see table 1.)

(3) Surveys will be issued in three stages, namely:—Preliminary, Intermediate, and final.

A *preliminary survey* of a bull may be issued when at least 10 of his daughters have completed one lactation.

An *intermediate survey* may be issued when at least eight of these daughters have completed a further lactation.

A survey will reach its *final stage* when three or more lactation records are available for at least six of the daughters.

(4) The sire shall be a pure-bred animal.

(5) The sires must be segregated from the herd, and complete particulars of all service dates and sires used must be recorded and made available for inspection as required.

(6) All the daughters of the sire to be surveyed shall be identifiable from the breed society's register or from particulars recorded under the group herd recording scheme.

(7) The application must show the particulars of all daughters which were identified as calves, and if any of

TABLE 1.

APPLICATION FOR SIRE SURVEY.

Herd Recording Group : Brisbane No. 1. Group Code No.: 60. Herd Index No.: 99. Owner : T. Brown.

Name of Sire to be Surveyed.	Particulars of all Daughters in the Herd.				Particulars of all Daughters which were sold, culled, died, etc.			
	Name.	Rec. No.	Last Calving Date.	Date of Birth.	Name.	Rec. No.	Last Calving Date.	Date of Birth.
Brisbane Rex	Biddy	8	21–8–56	16–6–53	Violet	65	15–6–56	11–2–52
	Iris	22	4–7–56	13–5–52	Susie	66	11–3–56	1–6–52
Herd Book No. 10142	Sarah	23	7–8–56	13–6–52				
	Strawberry	35	6–6–56	10–4–53				
His Sire Spring Hill Champ	Dahlia	39	30–7–56	11–7–54				
	Lily	44	14–4–56	1–2–53				
His Dam Manly Daphne	Carnation	45	15–5–56	3–3–53				
	Bonnie	48	16–6–56	7–1–53				
	Maisie	49	20–6–56	8–4–53				
	Topsy	54	17–4–56	18–3–53				
	Mabel	76	16–7–56	1–5–54				

Signature : T. Brown.

Date : 17th August, 1957.

these are not in the herd, an explanation such as "sold" or "died" must be given. (This is a necessary safeguard to ensure that the records of all available daugthers are included in the survey.)

(8) The surveys may be issued to the owner in one or both of the following forms:—

(*a*) In the form of a statement setting out the average production of all daughters of the sire which have been recorded.

(*b*) In the form of a statement setting out the average production (Maturity Equivalent) of all daughters of the sire which have been recorded, together with the average production of other mature cows in the herd.

(9) In compiling surveys, the following adjustments will be made:—

(*a*) Any obviously subnormal production and productions of B class cows will be

TABLE 2.

Private
Preliminary
Intermediate
Final
SIRE SURVEY.

Sire: Brisbane Rex { Sire: Spring Hill Champ.
Dam: Manly Daphne

Breed and Herd Book No.: Jersey 10142.

Owner: T. Brown. Group No.: 60. Herd No.: 99.

Year.	Maturity Equivalent Average Production of All Daughters.						Average Production of Other Mature Cows in the Herd.					
	Dtrs.	Lacts.	Milk.	Fat.	Test.	Days.	Cows.	Lacts.	Milk.	Fat.	Test.	Days.
1956–57	13	13	6535	281	4·3	244	27	27	6646	271	4·1	243

Year.	Particulars of Daughters.						Particulars of Other Cows.					
	Age.	Rec. No.	Milk.	Fat.	Test.	Days.	Age.	No.	Milk.	Fat.	Test.	Days.
1956–57	2	39	4605	211		240						
	2	76	4075	181		210						
	Av.	*2*	*4340*	*196*	*4·5*	*225*	*2*	*5*	*5234*	*202*	*3·9*	*240*
	3	8	5390	230		300						
	3	35	4310	179		270						
	3	44	4965	207		210						
	3	45	5895	229		270						
	3	48	6315	255		270						
	3	49	6210	244		240						
	3	54	5910	223		240						
	Av.	*7*	*5570*	*224*	*4·0*	*257*	*3*	*14*	*6032*	*220*	*3·7*	*274*
	4	22	5270	229		180						
	4	23	5015	185		210						
	4	65	7205	311		270						
	4	66	5555	257		270						
	Av.	*4*	*5761*	*246*	*4·3*	*233*	*4*	*4*	*6180*	*238*	*3·8*	*248*
	5	Nil					*5*	*27*	*6646*	*271*	*4·1*	*243*

excluded. (Cows are classed as B type according to the rules governing the group herd recording).

(*b*) Only the first 300 days of any lactation will be used in assessing the lactation yield.

(*c*) The first and second lactation only will be corrected to Maturity Equivalent productions.

(*d*) The first lactation may be excluded where any heifer comes into production under 21 months of age.

(10) A list of surveyed sires may be published annually.

(11) In all matters relating to the conduct of sire surveying, the ruling of the Director of Dairying shall be final. The Director of Dairying reserves the right to cancel or discontinue any survey where the results, or the manner in which the survey is being conducted by the member, are such that a reliable conclusion to the survey is impossible.

The results of sire surveys are issued according to the statements described in section 8. The form used is illustrated in Table 2.

Private Survey.

Owners desirous of having surveys made on sires which are ineligible for the surveys mentioned may apply for a "private" survey to be carried out. For example, owners whose sires have at least six daughters recorded for the first lactations could apply for this type of survey.

Results.

The sire surveying service for members of herd recording groups was introduced in 1955. In the first year surveys were made on 60 bulls. At the end of the 1956-57 recording year 139 surveys were compiled.

Information furnished by sire surveying is invaluable in selecting the next herd sire. If a sire on which a survey has been done is not available then the next best selection is the son of a proven sire out of a cow from a reliable family with consistently high production records, and whose daughters are also consistent producers. When the sire has been selected by referring to production records, the next essential feature is to check his capabilities by recording the herd in which he is used and making a survey of his progeny.

How to use Surveys.

The immediate use of a sire survey is to make available to the owner of the bull, as soon as possible, information concerning the quality of the bull he is using. If a preliminary survey of a bull is satisfactory he may retain him for use as long as he remains fertile, but if the results are unsatisfactory the bull may be culled immediately. Unforunately, many outstanding sires have been culled or sold before their heifers are in production and their true worth realised. This could be avoided by consistently using sire surveys.

Sire surveys are also important to breeders. Their more general use in stud herds would indicate to the industry the production characteristics of an increasing number of bulls from the best strains of breeding stock. Improvement by breeding will achieve its greatest progress if pedigree breeders safeguard the quality of their own herds by using only proven sires and bulls from proven strains. The importance of family or strain in breeding cannot be over-emphasised, and if dairymen concentrate on those studs which have families of high producing qualities, they will reduce considerably the gamble in the purchase of a herd sire.

In this State a survey is made of all pure bred bulls whose daughters are officially recorded for production. The names of the bulls together with the production records of their daughters are published annually. This publication enables dairy farmers when they are planning the purchase of a sire, to gauge the capabilities of some bulls used in the various studs.

Dairy Parade

FOR preference, dehorning should be done while animals are young. If you wish to obtain a dehorned dairy herd quickly, you may have to dehorn adult animals.

The guillotine dehorner is the most suitable instrument and it should be large and sharp enough to make a quick, clean cut. Just recently I heard of a Q.D.O. branch which bought a set of dehorners and hires them out to members at a low rate. It is a good idea.

Dehorning of cows causes a slight setback, resulting in lowered milk production for the milking period following the operation. You can cut losses to a minimum by observing these rules:—

(1.) Avoid weather conditions of excessive heat or cold, or driving rain. Winter months are best. Try to choose a period of mild, sunny weather when flies are not active.

(2.) Spray the heads of the animals a day or so before dehorning. Use one of the newer insecticides, as arsenic is of no value in this regard.

(3.) Have a strong crush where the cow can be securely held.

(4.) Soak the dehorners in an antiseptic solution (a two-gallon bucket is a suitable container) before starting and place them back in the solution when not in use.

(5.) When cutting the horn, the dehorners should be placed so that they will remove about ¼ in. of skin around the base of the horn. In practice this usually means cutting as close to the head as possible. When the dehorners are in position around the horn, snap them shut with a quick movement. Have the cow's head so tied that you can remove both horns from the one position.

(6.) Work with clean conditions and remove each cow from the yards as soon as she is dehorned. Dressings, medicaments or plugs should not be applied to the fresh wound—clean wounds heal quickly unless infection occurs.

(7.) Reserve a fresh paddock for the herd on the day of dehorning. A grazing crop of oats or a spelled pasture paddock is quite suitable. You'll find that cows will quickly settle down to grazing under these conditions.

(8.) Most bleeding should stop within a few minutes without any help from you. Excessive bleeding is rare but it can often be arrested by twining thin cord in a figure-of-eight-fashion around both horn bases and tying the ends of the cords over the poll.

(9.) In a small percentage of cases infection occurs after dehorning. This is usually indicated by the oozing of pus down the side of the animal's face. Treatment consists of douching out the horn cavity with a weak antiseptic solution to remove the pus and then dusting on a mixture of boracic acid and sulphanilamide powder. If a flystrike occurs the above treatment can be followed plus the use of a fly repellent AROUND (not on) the wound.

Stock of normal development over 12 months can be dehorned with the guillotine dehorners. Bulls should always be done when young. The dehorning of mature bulls is very difficult with guillotine dehorners and should not be attempted by this method.

—*W. F. MAWSON, Senior Adviser in Cattle Husbandry.*

A MILKING machine represents a big, and these days essential, investment on a dairy farm. Only regular care and maintenance will enable you to get your money's worth out of it through years of trouble-free milking.

Your first care should be for the vacuum pump. The vacuum pump should be oiled at every milking. In addition, it should be flushed out with a mixture of half kerosene and half vacuum pump oil at least every six months.

Wetting agents used in modern dairy cleansers may be causing vacuum pump breakdown through washing oil from it. Take special care to prevent these solutions from getting into your vacuum pump. Ensure that there's an effective vacuum tank or moisture trap between the pump and the rest of the machine.

Regularly dismantle and clean the vacuum relief valve, keep the pulsators free from dust and have the vacuum gauge repaired if it's faulty.

ATTENTION to the bowl locking nut and regular oiling will enable you to get your money's worth out of your cream separator.

A worn bowl nut is a hazard to the separator itself and to people working in the dairy. Instances of a separator "blowing up" during use are often traced to a poorly fitting bowl nut.

Check the bowl nut regularly by running it on to the bowl stem and trying to move it up and down. Vertical play will indicate that the threads are worn and the nut should be renewed. It is a wise precaution to renew the bowl nut every two years.

Don't allow the bearings in the frame to wear because of faulty oiling. Change the separator oil every six to eight weeks, using the grade of oil the manufacturer recommends.

—*J. D. ELRINGTON, Senior Dairy Machinery Adviser.*

Troubled with Mat Grass.

"N.R.," of Kilcoy, has been troubled with mat grass. He finds grubbing effective but slow and his experiments with 2,4-D seem to indicate to him that stronger spray mixtures are required.

Answer: The invading of land by mat grass usually means pasture deterioration. You should get better result by using pasture improvement to combat the invasion rather than weedkiller sprays. Spraying at best would only kill the mat grass leaving unsolved the more important problem of raising your soil fertility.

Mat grass seeds spread easily and rapidly in a pasture and will prove troublesome where your soil fertility has declined. Any practice you undertake to raise the soil fertility in your pastures will improve them and so help to supress mat grass.

Small areas of mat grass in your pastures may be grubbed or rotary hoed and the treated areas then planted with kikuyu grass. By applying farm yard manure or a nitrogen rich fertilizer to the freshly planted kikuyu you will help in its rapid establishment. You could plant Rhodes grass or paspalum seed and treat the freshly planted area with fertilizer.

Plate 1: Dairy Yards with Forcing Yard, Crush and Bail Unit Attached. Treated animals walk out onto pasture.

A Crush Bail For Dairy Cows

By L. A. WILLIS, Cattle Husbandry Branch.

Any upset to cows in the milking bails tends to decrease their milk yield and so reduce the dairyman's returns. This is one reason why a crush bail unit should be used when performing such operations as dehorning, drenching and inoculating.

In addition to avoiding a loss in milk production, a crush bail will make the work easier and quicker. There is also less risk of injury to both man and beast.

The accompanying illustrations show a well-designed crush bail on the farm of Mr. F. Meech in the Marburg district. Measurements and design are shown clearly.

Timber used in the construction of the gate is 3 in. x 1½ in. Other materials comprise 15 ⅜ in. x 5 in. cup head bolts; 4 ⅜ in. x 3½ in. cup head bolts, all with washers and nuts; 2 hinges and gudgeons; a pin fitted with a ring to hold the bail in the closed position, a U pin to act as a guide for the rope and a length of rope.

All bolt heads are on the inside of the gate to avoid injury to animals. A bolt through the post above each gudgeon prevents any lifting of the gate.

This combined gate and bail unit has an advantage over the slide gate type in that the gate is securely

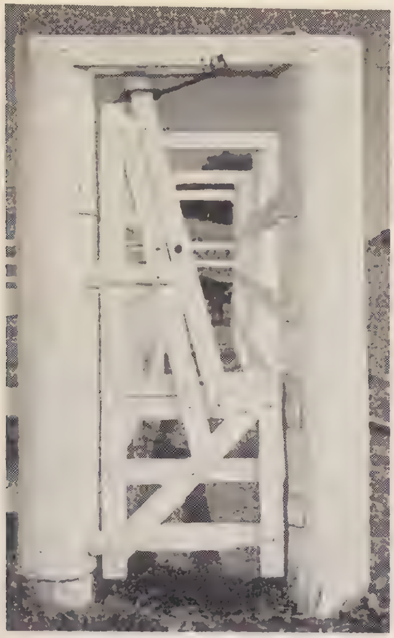


Plate 2.

Gate Closed with the Bail Open.

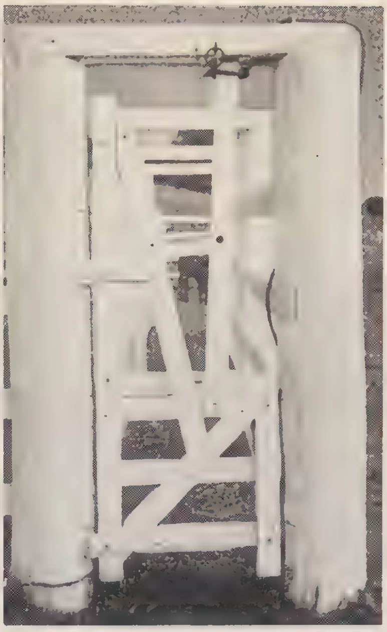


Plate 3.

Gate and Bail in Closed Position.

Plate 4.

Bail Being Used for Dehorning a Calf.

locked in the closed position with the bail portion open. There is no possibility of a beast's getting past before the bail can be closed. When the gate is opened animals may walk straight through.

The bail unit illustrated is most suited to animals handled frequently. Cattle not handled frequently show a tendency to put their heads down against the gate portion instead of through the bail opening.

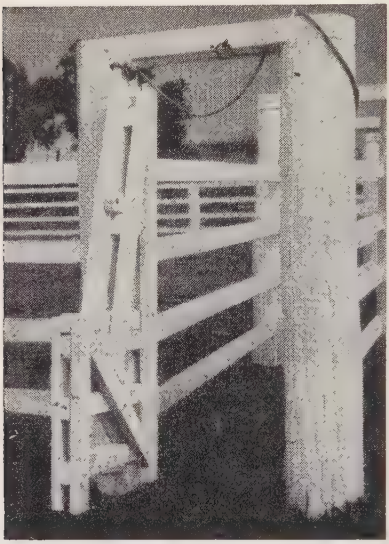


Plate 5.
Gate and Bail Unit Open.

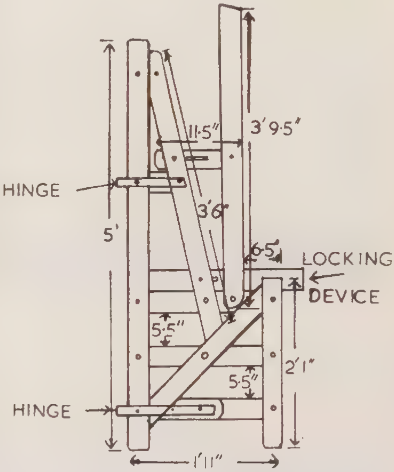


Plate 6.
Dimensions of Gate and Bail Unit.

* * *

Potatoes in Ipswich District

"R.B.," of Bundamba, has inquired about some aspects of potato production in his district.

Answer: The usual planting rate of potatoes is from 7 to 10 cwt. of seed potatoes per acre.

Growers in the Ipswich district generally favour Sebago as the best variety, with Sequoia and Katahdin as second and third preferences.

In south-eastern Queensland, growers have the possibility of growing two crops in the year. The first planting is during July-August and the second in February.

The price of seed varies from year to year but is usually about £2 to £2 10s. per cwt.

In the Ipswich area yields of 5 to 6 tons per acre are quite common.

Potted Facts—IV.

The Bean Knows No Frontiers

By D. R. LEWIS,
Division of Marketing.

"What do you want for tea, Tommy?".

"Baked beans, please, Mum".

Little Tommy's appetite for baked beans, together with the appetites of all the other little Tommies in Australia, not forgetting their sisters and their mums and dads, add up to quite a lot of beans. However, before we talk about figures of consumption and production, and prices, let us consider for a moment the origin and use of beans.

Beans have been known to man for many thousands of years. The prehistoric lake dwellings of Switzerland, the cliff houses of the American Southwest, the writings of early Greeks, Romans, Egyptians, and Peruvians, all testify to the ages-old existence and importance of the bean.

It is often said "the Greeks had a word for it." In the case of beans "the Indians had a word for them." To the Algonquin tribe of American Indians beans were known as "tuppuhguamash," the Hurons named them "orgaressa," and the Indians along the St. Lawrence river called them "sahe" or "sahu." We call them beans.

Beans form part of many national dishes—the macaroni and beans of Italy, the fried beans of Costa Rica, the "chili con carne" of Mexico, and last, but not least, the baked beans of New England.

Early American colonists learnt bean-cooking methods from the Indian squaws, and it is said the prim and proper Pilgrim housewives got quickly into the baked bean act. Religion forbade worldy activities on the Sabbath. This tasty Indian dish could be made up on Saturday night to provide a warm and filling Sunday supper. The Pilgrim Father joyfully said goodbye to cold cuts and adopted the baked bean as his Sunday special. This tradition is still favoured widely in New England, where baked beans and brown bread can be found everywhere on week-end menus.

Historians tell us that it was war to which beans owe their introduction throughout the world. They have been carried as a main, staple item in the fighting rations of armies on the march. Their low water content and high protein value makes beans a valuable source of food where transportation is a problem. Easily transported, they keep well, can readily be prepared in a number of ways, and are highly nutritious. And it was war that gave birth to the navy bean growing industry in Australia.

War-time Growth. Before the last war, navy beans were not produced on a commercial scale in Australia. Imports came from Canada, Japan, Argentina, and the United States of America. After the outbreak of the war in the Far East, the United States Army authorities urged the production of navy beans in Australia, with a view to meeting the needs of the forces supplied from this country. The Commonwealth Government therefore embarked on a programme to encourage the production of these beans.

Production in Queensland during the war years was as follows:—

1942-43	14,428 bushels
1943-44	8,797 bushels
1944-45	20,339 bushels
1945-46	12,487 bushels

(Source: Government Statistician.)

The production and sale of navy beans were controlled by the Commonwealth Government under the Food Control Regulations of the National Security Act, and control finally ceased with the harvesting and distribution of the 1946 crop.

Navy beans were produced both in Queensland and in New South Wales, and growers formed marketing boards in each State under the marketing legislation of the respective State. Thus was continued the orderly handling and marketing of the crop. In Queensland the Navy Bean Marketing Board has been functioning since November, 1946.

Demand Exceeds Supply. The demand for locally produced beans has remained firm since the end of the war, and is gradually increasing. Annual demand is now at a level of 2,000-2,500 tons. Production, however, in recent seasons has decreased considerably due to unfavourable weather conditions.

QUEENSLAND.

NAVY BEANS: Acreage, Production and Returns to Growers, 1947 to 1957.

Year.	District.	Number of Growers.	Acreage.	Total Production of Cleaned Beans.	Average Net Return per Bushel of Cleaned Beans at Grower's Siding.
				Bushels.	*s. d.*
1947	South Burnett ..	20	900	6,840	29 0
	Darling Downs ..	28	700	6,314	
1948	South Burnett ..	35	1,700	3,993	26 0
	Darling Downs ..	32	900	5,083	
1949	South Burnett ..	64	2,450	24,465	28 0
	Darling Downs ..	56	1,250	11,554	
1950	South Burnett ..	59	2,700	5,301	28 9
	Darling Downs ..	43	1,300	8,332	
1951	South Burnett ..	56	1,400	12,165	30 9
	Darling Downs ..	25	400	2,245	
1952	South Burnett ..	78	1,800	17,798	37 3
	Darling Downs ..	7	140	911	
1953	South Burnett ..	133	2,800	33,606	37 7
	Darling Downs ..	27	400	3,207	
1954	South Burnett ..	53	1,100	7,172	36 11
	Darling Downs ..	15	250	1,158	
1955	South Burnett ..	4	300	1,365	35 2
	Darling Downs ..	12			
1956	South Burnett ..	41	1,000	5,985	37 2
	Darling Downs ..	12		1,834	
1957	South Burnett ..	44	1,200	12,356	40 0
	Darling Downs ..	36	600	5,020	

(Source: The Navy Bean Marketing Board.)

The table on page 46 shows how production in Queensland has varied since the Board was constituted. It will be seen that our largest crop, that of 1953, amounted to just over 900 tons. Also shown are figures relating to the return to growers.

The chief production area in Queensland is in the South Burnett, in the Kingaroy district, but in recent years there has been renewed interest in the Darling Downs area. It is expected that this development will continue and much larger areas are expected to be planted on the Downs to navy beans in the coming season.

The main variety grown is the Californian White. Recently the Board received some seed of the Sanolac variety, which one of the large processors had imported from the United States. This variety is reported to be more upright than the Californian White variety, and to be suitable for straight-heading harvesting. Trials are to be made by the Department in the Kingaroy district.

"Mum, why are they called navy beans,"

"Well, Tommy, no-one really knows. It is said that beans were supplied to the American, Commodore Perry, on Lake Erie in 1812. Whether that is why white pea beans are often called navy beans I do not know, but it may be so."

◆

Getting Rid of Fowl Mites

Both poultry farmers and "backyarders" have reported a build-up in tropical fowl mites in their flocks. These pests `cause much irritation to the birds and to people working in fowlhouses.

The tropical fowl mite is a bloodsucker, and can be found on the birds both day and night. It can cause loss of production and unthriftiness through irritation, and in some cases blood-sucking.

Mites on the birds can be controlled by painting the perches with a special BHC perch paint. This paint acts by fumigating the fowls' feathers while they're roosting—the warmth of the birds' bodies causes the BHC to vaporise. Before use, most commercial preparations of perch paints have to be diluted with sump oil. When the mites are present on the walls of the fowlhouse, these should be sprayed with a dieldrin spray.

◆

Control of Bell Vine

Inquiries have been received about chemical control of Bell vine. Frequently the vine gets a good hold where dry spring conditions have prevented thorough land preparation.

Both M.C.P.A. and 2,4-D used at a concentration of 0.1 per cent. active ingredient will kill Bell vine. Such treatment should cause no damage to maize or grain sorghum crops provided they are not too advanced in growth. If the leaf is fully expanded some damage to the crop may be caused by spraying at that stage. Where such might be thought to occur a small area should be sprayed as a trial before attempting to spray the whole crop.

Some spraying equipment is fitted with crop booms which permit spraying between the rows below the level of leaves of the crop without damage, Such equipment allows the spraying of the crop without damage at a much later stage than where overhead boom sprays are used.

Plate 1. **Protected Native Fern, Elkhorn Fern, at Binna Burra.**

Queensland Flora Conservation

By C. ROFF.

Their comparative inaccessibility has given the best protection to native plants in the past, but the advent of modern transport has brought many more of these within the reach of a larger section of the community.

In Queensland the necessity for preventing the wholesale destruction of our native flowers, ferns, palms and orchids has been recognised for many years and legislation requirements are embodied in *"The Native Plants Protection Act of* 1930."

The following relevant information should be of general interest:—

Definitions.

Various terms are defined in the legislation and it is particularly important to note—

> "Native plant"—Any plant which is indigenous to Queensland, and includes any part thereof and the flower thereof, the term also includes any other plant which the Governor in Council may, by Order in Council from time to time, declare to be a native plant for the purpose of this Act.

"Pick"—(in relation to a native plant) means to gather, pluck, cut, pull up, destroy, take, dig up, remove, or injure the native plant or any part thereof.

Administration.

Certain officers of the Department of Agriculture and Stock are responsible primarily for administering the Act and, in addition, as many persons as deemed necessary for the conservation of flora in any locality may be appointed as honorary rangers.

The credentials of a person desiring appointment as an honorary ranger are important and accordingly it is necessary for each applicant to supply certain personal details and a suitable reference.

Plate 2.

Protected Native Flower, Christmas Bells, at Caloundra.

All members of the police force, authorised local authority officers, certain forest officers and honorary rangers, in respect of any person committing or suspected of committing an offence, may

(*a*) Require him to give his name and address.

(*b*) Require him to deliver up any protected native plant in his possession.

These powers are also conferred on the owner or lessee of private land but only whilst the offender is on such private land.

It is an offence for any person to refuse to give his name and address, to give a false name and address, or to refuse to deliver up a protected native plant.

Protected Native Plants.

The following plants are protected throughout the whole State for an unlimited period, and from time to time as the occasion demands other plants may be added:—

The plants listed may not be picked on any Crown land, State Forest, National Park, public park, road or on land dedicated or reserved for public purposes. With regard to private land, protected native plants may only be collected after the owner's or lessee's permission has been obtained.

FERNS.

Adiantum aethiopicum	Common maiden hair fern
Adiantum formosum	Scrub maiden hair fern
Adiantum hispidulum	Five-fingered maiden hair fern
Adiantum lunulatum (A. philippense)	Kidney maiden hair fern
Alsophila australis (*Cyathea australis*)	Tree fern
Alsophila baileyana (Cyathea baileyana)	Wig tree fern
Alsophila excelsa (Cyathea cooperi)	Tall tree fern
Alsophila leichhardtiana (Cyathea leichhardtiana)	Prickly tree fern
Alsophila robertsoniana (Cyathea robertsiana)	Robertson's tree fern (Roberts's tree fern)

FERNS—continued.

Alsophila rebeccae (Cyathea rebeccae)	Broad-leaved tree fern
Asplenium laserpitiifolium	Johnston River maiden hair fern
Asplenium nidus	Bird's nest fern
Asplenium simplicifrons	Narrow-leaved bird's nest fern
Davallia pyxidata	Hare's foot fern
Dicksonia antarctica	Mountain tree fern
Dicksonia youngiae	Young's tree fern
Lygodium spp.	Climbing maiden hair ferns (all species)
Ophioglossum pendulum	Ribbon fern
Platycerium grande	Staghorn fern
Platycerium alcicorne (P. bifurcatum)	Elkhorn fern
Pteris spp. (all species)	
Vittaria elongata	Bootlace fern

PALMS.

Archontophoenix alexandre (A. alexandrae)	Northern piccabean
Archontophoenix cunninghamii	Southern piccabean
Bacularia monostachya (Linospadix monostachyus)	Walking-stick palm
Drymophloeus normanbyi (Normanbya normanbyi)	Black palm
Licuala muelleri (L. ramsayi)	Fan palm
Livistona australis	Cabbage tree palm

ORCHIDS.

Calanthe veratrifolia	Scrub lily
Cymbidium albuciflorum	Long-leaved arrowroot orchid
Cymbidium canaliculatum	Arrowroot orchid
Cymbidium sparkesii	Black orchid
Cymbidium suave	Slender arrowroot orchid
Dendrobium aemulum	Box-tree orchid
Dendrobium beckleri	Small pencil orchid
Dendrobium bigibbum	Purple orchid
Dendrobium canaliculatum	Tea tree orchid
Dendrobium delicatum	
Dendrobium fusiforme	
Dendrobium gracilicaule	Slender orchid
Dendrobium johannis	Golden orchid
Dendrobium kingianum	
Dendrobium linguiforme	Tongue orchid
Dendrobium phalaenopsis (D. bigibbum var. *phalaenopsis)*	Large purple orchid
Dendrobium smilliae	Bottle brush orchid
Dendrobium speciosum	King orchid or rock lily
Dendrobium superbiens	Torres Strait orchid
Dendrobium teretifolium	Pencil orchid
Dendrobium tetragonum	Spider orchid
Dendrobium toftii	
Dendrobium undulatum	Curly orchid
Eria fitzalanii	
Oberonia spp.	Soldier's crest orchid (all species)
Phaius bernaysii (P. australis var. *bernaysii)*	Yellow Phaius
Phaius grandifolius (P. tankervilliae)	Common Phaius
Phalaenopsis amabilis	
Phalaenopsis rosenstromii (P. amabilis var. *rosenstromii)*	
Pholidota imbricata	Banana orchid
Sarcochilus fitzgeraldii	
Sarcochilus hartmannii	

MISCELLANEOUS PLANTS.

Blandfordia spp.	Christmas bells (all species)
Boronia spp.	Boronia
Cordyline terminalis (Codyline spp.)	Palm Lily
Dischidia nummularia	Button orchid
Eurycles amboinensis	Cairns lily or Cardwell lily
Helichrysum	Everlastings
Helipterum	Everlastings
Hoya australis	Hoya or wax flower
Lycopodium phlegmaria	Tassel fern
Lycopodium spp.	All Lycopods and tassel ferns
Myrmecodia antoinii	Ant orchid
Rhododendron lochae	
Selaginella spp. (all species)	
Sowerbaea juncea	Vanilla lily

Specified Areas.

The legislation provides for the declaration of certain plants in specified districts as protected native plants and the following have been declared as such for a unlimited period in the localities indicated.

BISHOP ISLAND IN MORETON BAY.

Aegiceras majus (A. corniculatum)	River mangrove
Avicennia marina var. *resinifera*	White mangrove
Casuarina equisetifolia var. *incana*	She oak
Enchylaena tomentosa var. *glabra*	
Erythrina caffra	Coral tree
Ficus cunninghamii (F. lacor)	Cunningham's fig
Hibiscus tiliaceus	Cotton tree
Ipomoea pes-caprae	Goatsfoot convolvulus
Mesembryanthemum aequilaterale (Carpobrotus glaucescens)	Pigface
Myoporum ellipticum	
Pongamia glabra (P. pinnata)	Pongamia tree or bean tree
Salicornia australis	Glasswort
Sesuvium portulacastrum	
Suaeda maritima	Sea blite
Vitex negundo	
Wedelia biflora	
Grasses—	
Brachiaria distachya (B. miliiformis)	
Chloris divaricata	A star grass
Cynodon dactylon	Common couch grass
Eriochloa sp.	
Lepturus repens	
Paspalum distichum	Freshwater couch grass
Paspalum vaginatum	Saltwater couch grass
Phragmites communis	Common reed
Rhynchelytrum roseum (R. repens)	Red Natal grass
Spinifex inermis (S. hirsutus)	Spinifex grass
Sporobolus virginicus	
Sporobolus virginicus var. *minor*	
Zoyzia sp. *(Zoisia macrantha)*	Coast couch grass

Plate 3.

Southern Piccabean, a Protected Native Palm, Growing at Buderim Mountain.

FRIDAY ISLAND IN TORRES STRAIT.

Any tree or bush of the genus *Acacia*	Wattles
Albizzia procera (Albizia procera)	Acacia tree
Avicennia officinalis (A. marina var. *resinifera)*	White mangrove
Any tree or bush of the genus *Banksia*	Honeysuckle
Bruguiera rheedii (B. gymnorhiza)	Black mangrove
Casuarina	She oaks—any variety
Ceriops candolleana (C. tagal)	Orange mangrove
Cocos nucifera	Coconut
Eucalyptus alba	Gum tree
Eucalyptus corymbosa (E. polycarpa)	Bloodwood
Eucalyptus crebra	Ironbark
Eucalyptus tereticornis	Blue gum
Any tree of the genus *Ficus*	Figs
Licuala muelleri (L. ramsayi)	Fan palm
Any tree or bush of the genus *Melaleuca*	Tea trees

Plate 4.

Yellow Phaius Orchid, a Protected Native Orchid, Growing at Stradbroke Island.

FRIDAY ISLAND IN TORRES STRAIT—continued.

Mimusops browniana (Manilkara kauki)	Wongi tree
Any tree or bush of the genus *Pandanus*	Pandanus trees
Ptychosperma elegans	Palm tree
Rhizophora mucronata	Red mangrove
Siphonodon pendulum	Passion fruit tree
Terminalia catappa	Torres Strait almond
Terminalia platyphylla	Pear tree
Tristania suaveolens	Swamp mahogany

For scientific purposes the picking of protected native plants may be permitted. The terms and conditions under which a permit is granted are always indicated on the permit.

Plate 1: Dipping Citrus. Mould control in citrus can be effected by dipping the fruit in a solution of 4 per cent. borax and 2 per cent. boracic acid.

Storing Fruit In The Home

By C. D. STEVENSON,
Assistant Physiologist, Horticulture Branch.

SUCCESSFUL storage of fruits depends on the application of the same simple rules that apply to the storage of vegetables for home use. They are:—

Store only sound, mature fruit. This means that all cut, bruised, malformed fruit should be used for immediate consumption and not kept for storage purposes. Immature fruit develops disorders more rapidly during the storage period than mature fruit, and over-mature fruit has only a very short life.

Make regular inspections during the storage period. Any fruit showing signs of breakdown must be removed immediately to prevent spread of the rots to other fruit.

Watch for Signs.

Don't try to keep the fruit too long. All fruits are living material and have only a limited storage life. During your inspections look for signs indicating that the end of the storage life is approaching. The most important sign is a rapid increase in the number of fruit showing decay. When the number of disorders exceeds 10 per cent., the fruit should be used as soon as possible. Other indications are loss of the fresh look and the development of excessive softness.

Knowing when to pick is most important. There is no sure way of telling this, but these facts will help you!

Maturity is usually associated with softening of the tissue and, by squeezing the fruit gently with the fingers, the degree of maturity can generally be ascertained.

Colour changes are also useful. Some fruits change from green to yellow at maturity, others develop a characteristic red blush, whilst some acquire a definite bloom.

Ease of removal from the parent plant is another guide; some fruits are easily removed by gentle finger pressure when maturity is reached.

However, experience with a particular crop is invaluable as a means of selecting fruit of the right maturity for storage purposes.

High humidities are necessary during the storage period. It is usually difficult to maintain these humidities under home storage conditions. Keeping the floor—on which the fruit is stored—damp by sprinkling with water largely assists in maintaining the required humidity. But care must be exercised to ensure that the fruit does not get wet, as this condition favours mould growth. If humidities are too low shrivelling may occur.

Apples' Long Life.

Of all fruits grown, apples have probably the longest storage life. Some varieties, such as Democrat and Granny Smith, can be held in a cool, well-ventilated place for several months while the shorter storing varieties, such as Delicious or Jonathans, will keep under the same conditions for several weeks. Storage life is extended greatly by using a refrigerator, but since space in the home refrigerator is limited it is better keeping what space is available for more perishable fruits.

Stone fruits have a very short storage life and cannot be kept more than a couple of days unless placed in a refrigerator. Peaches have a shorter life than plums and will only keep in the refrigerator from one to two weeks while plums under the same conditions can be held for periods up to a month. Apricots and nectarines have a storage life about the same as peaches and must be kept refrigerated.

Tropical fruits do not keep very long at ordinary air temperatures and even when held in the refrigerator, care must be taken to ensure that the temperatures are not too low as the fruits will either blacken or develop breakdown.

Mangoes can be kept in the refrigerator from two to three weeks but they deteriorate rapidly at air temperatures.

Papaws are usually picked when showing about half colour and will ripen in a few days at atmospheric temperatures. If kept in the refrigerator they may be held from two to three weeks, but as they develop rots very quickly during ripening they should be eaten soon after removal.

Pineapples, if placed in the refrigerator when fully ripe will keep in good condition for two weeks. Mature green fruit if kept under the same conditions may fail to ripen satisfactorily and consequently they should not be placed in a refrigerator running at low temperatures. If satisfactory temperatures are obtained, they should keep from three to four weeks.

Bananas should never be kept in a refrigerator as their skins will turn black and the pulp will fail to ripen.

This fruit is best picked when it is fully grown but with the skin green in colour. They can be ripened rapidly by cutting off hands and placing them in a gas oven for a few nights. The oven must be quite cool, otherwise the bananas will be severely damaged.

Moulds on Citrus.

Oranges, mandarins and grape fruit will keep in a well-ventilated kitchen cupboard for two or three weeks and this time will be about doubled if they are kept in a refrigerator. These fruits are very badly affected by moulds and these can largely be controlled by dipping the fruit, prior to storage, in a solution containing a tablespoon of borax and a dessertspoon of boracic acid to the pint. In order to wet the fruit a small amount of detergent should be added to the solution.

Lemons are much hardier and should keep for several months at air temperatures. Dipping them in the same solution as for the other citrus fruits will help to control mould growth.

The storage life of grapes depends largely on the variety but generally grapes can be kept for a week or more at air temperatures, provided that they are fully mature. If, during inspections, any mould is noticed, the grapes should be consumed immediately. Packed in plastic bags and held in the refrigerator their life should be well in excess of two weeks.

Strawberries are very perishable and should always be kept in the refrigerator.

Their storage life is only about a week. They are very severely affected by mould and should be consumed immediately if any mould appears.

Avocadoes will slowly ripen at air temperatures in a week to 10 days. For longer periods they should be kept in the refrigerator after ripening first at air temperatures.

Odours given off by stored fruit can taint stored dairy produce and eggs, and for this reason fruit should be kept in sealed containers where possible.

Supply of Buffel Grass Seed

Inquiries have been received regarding supply sources of the Biloela strain of Buffel grass.

The availability of the Biloela strain of Buffel grass varies considerably from season to season.

Any of the following list of suppliers may have seed available for sale: A. E. Larsen, Thangool, via Rockhampton; S. J. Allen, Jambin, via Rockhampton; H. H. Rackemann, Lawgi, via Rockhampton; R. W. Theodore, Moura, via Rockhampton A. D. Murray, Bushley, via Rockhampton.

The seed merchants may be able to supply Biloela strain Buffel grass from time to time.

for the junior farmer

By J. PARK,
State Organiser, Junior Farmers' Organisation.

COMMITTEES.

If a member is nominated or invited to serve on a committee, he, or she, should not refuse except for some very good reason—a reason that seems good to others besides oneself. If it is accepted, then the job must be taken seriously and the meetings attended. Membership of a committee brings responsibility.

When committees are formed it is usual for the club leader to act as chairman of them, ex officio (by virtue of his office). However, because he will undoubtedly be a very busy person, he usually delegates his authority to the deputy leader. If for some reason the deputy cannot do the job, the members of the committee elect their own chairman, with any one of them having the right to make a nomination.

The definition of the duties of a committee is called the "terms of reference," and in their actions and deliberations the committee must not go outside these terms. It is most important that the members are clear about them, and that they know their powers. For example, a committee may be given executive powers, and thus have authority to organise and carry out some course of action. In such a case the committee can, obviously, do a great deal without asking the club, for the club members have told them "to get on with the job." There must, however, be some limits to every committee's powers, and these should be stated clearly in the terms of reference. For example, a committee appointed to organise a Show exhibit would probably be told the maximum amount of money that might be spent.

On the other hand a committee might be set up merely to inquire into some problem and to report to the club when the inquiry is finished. The committee has then no executive powers. Its task its to collect information and make a report, and the next move is up to the club when it has received the report. Such a committee may make recommendations, but it has no power to carry them out.

Must Use Discretion.

It is, of course, impossible to put into words instructions concerning everything, so the members of the committee must use their discretion and steer a reasonable course between timid refusal to accept responsibility and a disregard of the opinions of their fellow members who happen not to be on the committee. The test is often the question: "If I were not on this committee, would I want this matter referred to me before the action was taken?"

The member who is not on the committee, but who has helped in its appointment, must be ready to give it powers, unless it is a committee appointed only to advise. It is unreasonable to vote that a job shall be given to a committee to do, and then to insist that all decisions shall be made by the club. The committee may well say: "What's the good of having us?"

The same balance of responsibility has to be kept between the officers (the executive) and the members of the club. When the club discusses and decides its policy (the big ideas), the members must be ready to take notice of the advice of their officers, and the officers in carrying out their routine duties must see to it that these do not in any way clash with the declared policy of the club.

When choosing people to serve on a committee, it is their interests, ability and character that should be considered. To appoint a member merely because he is free to attend the meetings is to do so for the wrong reasons. We need people on committees who not only can but will attend meetings and who are prepared to work. Also, the work of different committees should be spread out amongst the members and not always given to the same people. In this way opportunities to learn are provided for the many and not only for the few; the club thereby gains in strength.

Before a member nominates anybody for an office or for membership of a committee he should make sure that the nominee is willing to accept the position.

Committee meetings are, strictly speaking, private affairs, and harm can be done by individual members speaking freely in public about everything that happens at them. That is why it is so important for a committee to report often and fully to the club. If this is not done the other members may lose confidence in the committee and begin to think that a lot of jiggery-pokery is going on. In this they may be, and probably are, quite wrong, but they must be given no cause to feel that way and to get restive.

Major Projects for 1959

THE two main projects adopted by the Queensland Junior Farmers' Organisation for Queensland's Centenary year will cover the twin objects of planting trees on a State-wide basis and a drive to cut down on farm accidents.

The idea of a State tree planting programme was recommended to junior farmers by the Minister for Education (Hon. J. C. A. Pizzey) last year. He also suggested that the organisation adopt a programme to train all members in first aid with a view to their gaining their certificates during centenary year. However, the response to this suggestion has been so great that already large numbers of members have received their certificates and many more will be gaining theirs within the next few weeks.

It has now been decided that the organisation's main project for 1959 will be an all-out drive to lower the alarming rate of farm accidents occurring in Queensland each year. This was decided at a meeting of the State council executive in Brisbane.

The first step in the plan will probably be a survey by clubs, in conjunction with their local hospitals and ambulances to determine the number of farm accidents, fatal and otherwise, resulting each year and their main causes.

This will be the first time that such a large-scale survey has been conducted by junior farmers, and some eye-opening results are expected. To date the only figures available are those issued by the State Government Insurance Office in relation to claims made on workers' compensation policies.

But these figures would by no means be complete, as they do not refer to the large number of farm workers not covered by any policy and, in particular, members of a farmer's own family, and the farmer himself.

The next step will be a drive by members, clubs, zones and State council to educate farmers on the rules of farm safety and accident prevention. It is also hoped that members of a farmer's family can be made aware of the risks they run on the average farm, and encourage them to cover themselves by some form of compensation or hospital benefits scheme.

These activities will be in addition to the other normal plans for 1959 and have been sponsored as part of the organisation's tribute to Queensland's centenary.

* * *

In Service Still

An original outstation of Glengallen Station, now a store for baled hay.

Holiday First Aid

HERE IS YOUR "WHAT-TO-DO-IN-EMERGENCY" GUIDE FOR HOLIDAY HAZARDS:

Holidays are for fun and relaxation. But accidents do happen and it is as well to be fully prepared for them.

These first aid hints will prove very useful and should be kept where they can be quickly found.

DROWNING.

If you are faced with having to revive an apparently drowned person your use of the correct method will, perhaps, save a life that might otherwise be lost. Directly the victim is taken from the water and if he is unconscious, try to determine whether it is because of a head injury or shock. If breathing has stopped, apply artificial respiration at once and, if at all possible, send for a doctor.

In the meantime, to restore breathing, apply this simple method of artificial respiration, the Holger-Neilson method, and persist until breathing is normal again or until a doctor has arrived to take over:

(1) Check the mouth and throat for any obstruction . . . remove any dentures . . . and have the patient so placed that the head is lower than the feet so that any fluid in the breathing passages will drain more freely.

(2) Kneel down in front of the patient's head (See Plate 1).

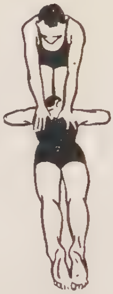


Plate 1.

(3) Place your hands flat on his back, thumbs just touching and with fingers spread outwards and downwards. (See Plate 2.)

(4) Compression movement should now commence. In this position you should be able to watch the patient's mouth and nostrils for signs of returned breathing.

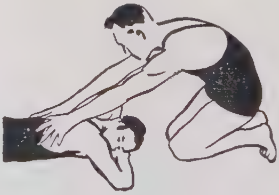


Plate 2.

Move forward until your arms are almost vertical (Plate 3), allowing your weight to compress the patient's back with a

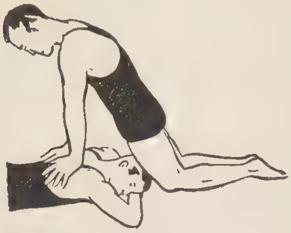


Plate 3.

slow steady pressure downwards on the hands. Be sure your hands do not slip or move and that your elbows are kept straight.

(5) Now release the pressure, avoiding any thrust, from the patient's back by slightly rocking backwards. Take your hands from his back and grasp his arms immediately above the elbow (Plate 4), and with your fingers and thumbs together, draw his arms upwards and towards you (Plate 5), lifting so that you can feel the resistance of his weight. Keep your arms straight and rock backward, drawing the patient's arms upwards all the time. At the completion of this movement drop his arms.

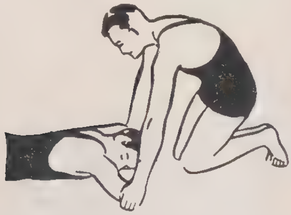


Plate 4.

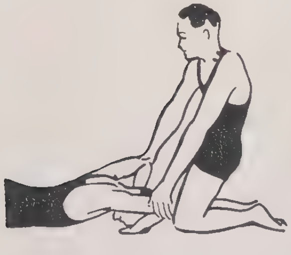


Plate 5.

(6) Repeat these two movements alternately 12 times a minute, no more, no less, until breathing is restored to normal, or at least until a doctor arrives to take over.

And remember always you are fighting for a life . . . keep cool and follow the instructions.

We suggest you practice artificial respiration before you set off on your holiday or trip . . . it will save confusion if the need for it arises and will give you confidence.

SNAKE BITE.

The bite of a venomous snake looks like two pin pricks. There may be several punctures around the affected area, and if you are not sure of the kind of snake which made them, treat the wounds as for venomous bites.

(1) If the bite is on a limb apply a ligature between the bite and the heart, placing it around the limb above the knee or the elbow. Tighten it so that the flow of blood to the bitten part is stopped. You must act quickly because the venom may spread rapidly. If a finger or toe is bitten a ligature at the base will be sufficient.

(2) Wash the bite to remove any venom on the skin around the wound.

(3) Pinch up the skin and cut out the bitten part . . . or make several cuts over the bite and encourage bleeding to wash out the venom . . . cut in line of the length of the limb, at least ¼in. deep.

(4) Send for or get a doctor as soon as possible . . . tell him if you know the kind of snake. If the snake has been killed let the doctor see it.

(5) Keep the victim calm . . . it will ease the shock . . . assure him that most snake-bitten persons in Australia recover. Keep him resting as much as you can.

(6) Give hot drinks such as tea, coffee or milk.

(7) If breathing should fail, apply artificial respiration.

(8) Relax the ligature every half hour for at least a minute . . . and remove entirely after two hours if a doctor has not arrived.

(9) If the bite is not in such a position that a ligature can be applied, adopt treatment 3 to 7 as above.

CHOKING.

Open the mouth and attempt to remove the obstruction with the forefinger. If this is not effective, strike the back between the shoulder blades with the open hand. This helps expel the object.

GASES AND SMOKE.

Remove the patient from the source and into the fresh air.

STRANGULATION.

Cut away and remove whatever is constricting the throat. Immediately the cause of suffocation has been removed . . . if the patient is not breathing normally . . . carry out artificial respiration.

TICKS.

The bush or scrub tick, found mainly in scrub country along the coast, is dangerous. Unless gorged with blood it is difficult to detect . . . the head is always buried in the skin and only the body is visible. The bite at first causes an itch, which may be followed by a feeling of weakness or nausea. If the tick is allowed to remain in the skin for any length of time the result can be serious, especially for children.

It is advisable to check the body for ticks frequently.

Try to remove the tick entirely, it may be killed first by dropping turpentine or kerosene on it. Tweezers pressed into the skin around the head of the tick should expel it. If the head does not come out at once apply iodine to the spot.

Any case of illness suspected from tick bite should be taken to a doctor.

SPIDERS.

Our two most dangerous spiders are the RED BACK and the FUNNEL WEB. The Red Back is a black insect with a red stripe on its body . . . This unpleasant spider is generally found in dark corners, tins and amongst rubbish . . . a favourite haunt is the lavatory seat. The Funnel Web spider is found in crevices in buildings, logs, trees, and stumps. Its bite is very dangerous and should be treated as for snake bite . . . a ligature tied between the bite and the heart and the blood induced to flow . . . if need be, by making several cuts at the bite mark. In either case, give fluids, keep the patient warm, and send for a doctor.

INSECT STINGS.

Extract the stings if possible and apply weak solution of ammonia, baking soda, or the household blue bag. For most insect stings, Benadryl cream is recommended.

JELLY FISH OR BLUE BOTTLES.

Rub the affected part with a handful of wet sand, then apply a weak solution of ammonia or the blue bag. Give hot drinks.

SUNSTROKE AND HEATSTROKE.

The same treatment is right for either. A splitting headache may be the first sign, then everything looks red to the victim; he may even lose consciousness. A rise in temperature is almost immediate and can be dangerous. A doctor should be sought at once. Meantime, if you have a thermometer and it shows over 105, apply cold water and keep fanning to reduce temperature. Have a cold bath ready, the doctor may prescribe it when he arrives. If you have no thermometer, do nothing beyond loosening all tight clothing until the doctor arrives.

HEAT PROSTRATION OR HEAT EXHAUSTION.

This has different symptoms, the temperature goes down and the victim feels cold and clammy. Send for a doctor at once, and, regardless of the heat of the day, take all measures to keep the patient moderately warm.

SUNBURN.

Bath the burned area with warm water and apply a soothing lotion. If it is a bad case call a doctor. Prevention is better than cure, especially if the skin is fair. Keep a good sunburn preparation handy . . one with a "sun screen" or a "barrier" base. This will help, but you must still take care not to overdo "baking."

BURNS AND SCALDS.

Serious burns and scalds, those affecting large areas, should not be touched except by a doctor. Make no attempt to remove clothing from the burned area. If it is exposed, cover with a clean towel or sheet. Keep the patient warm with blankets, but do not give alcohol.

With less serious burns or when medical help is not available, remove only such clothing as will come away easily. Immerse the burned area in water at body temperature until the proper dressings are ready. A level dessertspoonful of common salt in a pint of water will make a soothing lotion. Dress with strips of lint, linen or gauze soaked in a similar solution. Keep dressing moist until medical aid comes and give plenty of fluids to drink.

For chemical burns, say an acid, wash with a solution of bicarbonate of soda. If alkaline, use a weak acid such as vinegar. If in doubt as to the nature of the chemical, use plenty of warm water.

CUTS.

Cuts from oyster shells, rocks, tins, broken glass, etc., may easily turn septic. Thorough cleansing and the application of an antiseptic before bandaging is effective against blood poisoning. Very deep cuts should be seen by a doctor as soon as possible.

BLEEDING FROM VEINS AND ARTERIES.

Send for a doctor and try to stop bleeding by pressing a pad of clean material over the wound. If possible, the injured part should be elevated and the patient made to lie down. If this does not halt the bleeding, apply a tourniquet . . . pressing the main artery against a bone with the fingers. Tourniquet should be loosened every 30 minutes. Tourniquets are a last resort only. Stimulants should not be given.

FRACTURES.

Apply firm bandages and ice packs to control internal bleeding. Do not move limb unnecessarily. Place in a light splint and give complete rest until a doctor or ambulance man arrives. Asprin may be given to relieve pain.

TETANUS.

Tetanus may enter through a flesh wound although the wound may not be easily seen. Mostly the symptoms are a stiffness of the neck and lower jaw. Later, spasms of other parts of the body might develop. All wounds that could be infected should be cleaned and an antiseptic applied. The patient should be taken to a doctor at once. For lasting protection, immunization is recommended. Seek the advice of your doctor before you go away.

FOOD POISONING.

Contaminated food is not always easy to detect by taste, smell or appearance . . . for safety's sake:—

Avoid blown tins or any canned food which when opened does not taste or smell right.

Store all left over foodstuffs in a cool place protected from flies and rats and cockroaches.

Hands and all cooking utensils must be thoroughly clean.

Symptoms of food poisoning are vomiting, abdominal pains, muscular pain and prostration. Call a doctor and keep the patient warm, giving fluids only until he arrives.

KEROSENE POISONING.

This can be avoided by keeping kerosene in properly labelled bottles and if there are children around, bottles should be kept well out of their reach.

On no account should anything be given to make the patient vomit. This is dangerous and could cause death in children. Medical attention must be obtained at once.

—*Qld. Health Education Council.*

A Veterinary Examination

A candid camera shot taken on the property of Mr. B. Hayes, Coominya.

Promise Seen In Schools For Farmers

By **P. McCALLUM**, Senior Dairy Adviser.

"These farmers' schools should bear fruit and could be enlarged upon, once farmers get used to the idea." That is what Mr. J. W. Lewis, a Laravale farmer, had to say about the Farmers' School held at Beaudesert on October 2 and 3, 1958.

The two-day school was arranged by the East Moreton Dairy Extension Advisory Committee. It was officially opened by the Minister for Agriculture and Stock (Hon. O. O. Madsen), who said he was pleased with the work being done by the Dairy Extension Advisory Committee. He felt the average farmer today realised the benefits of scientific farming.

The school was attended by 24 farmers from the Beaudesert, Beenleigh and Southport districts. The

Plate 1.

The Minister for Agriculture and Stock (Hon. O. O. Madsen) Opening the Farmers' School at Beaudesert. On his right is Mr. R. L. Harrison, M.L.A., who is chairman of the East Moreton Dairy Extension Advisory Committee.

Plate 2.

Farmers Show Great Interest in a Lecture During the School.

Plate 3.

In The Field, the School Attends a Fertilizer Demonstration at the Tabragalba Property of Mr. B. Persse.

theme of the school was "The Maintenance and Improvement of Soil Fertility."

Lectures by officers of the Department of Agriculture and Stock were given on all aspects of soil management. Subjects embraced soil formation, land preparation and its aims, the role of legumes, the use of fertilizers, soil conservation and soil conditions and plant growth.

Coloured slides and movie films were also shown.

Visits were made to two farm demonstrations. On the first afternoon, a fertilizer trial was inspected on the farm of Mr. B. Persse, Tabragalba. The following afternoon the students viewed land preparation methods and the implements used, and soil conservation work on Mr. E. R. Schwarz's property at Christmas Creek.

Those who attended the school were a good mixture of experienced farmers and junior farmers. The older farmers were still young in thought and looking for new ideas. The younger farmers listened and learned and joined in the discussions.

Lecture periods lasted 25 min., followed by discussion periods of 20 min. Mr. G. Teese, Innisplain, commented that these discussion periods were very important. Evidence of this lay in the fact that not one discussion period lagged. He said that lecture periods should not encroach on the time allowed for discussions.

Points of interest which arose out of the school were:—

1. All farmers felt that they had learnt something from the school.

2. All stated they learned some improved farming practice from their association with the other farmers they met at the school.

3. Only one farmer considered a two-day school too inconvenient.

Plate 4.

Mr. E. R. Schwarz explains Methods of Land Preparation for Crops at his property at Christmas Creek.

Plate 5.

Mr. W. J. Roche, Adviser in Agriculture, Explains the Formation of Contour Banks Used in Soil Conservation Practice.

4. No one considered the lecture periods too long.

5. Only one farmer thought the lectures were too technical.

Generally, it was felt that there was great promise in schools for farmers throughout the dairying districts of Queensland.

* * *

Elephant Grass

"K.L.," of Yerra, has inquired about the value of Elephant grass.

Answer: Elephant grass is a highly productive plant producing a large bulk of feed. It is a good grass for dairy production. The most satisfactory way to use it is as "chop-chop," though with careful management it can be successfully grazed. It will ratoon well if properly managed.

The use of farmyard or nitrogenous fertilizers, together with the application of irrigation, generally enhances crop yield. In various parts of the world, yields from 10 tons to 40 tons an acre a year have been recorded. Under proper management, high yields are common. Although it is a fairly hardy grass, it does best under careful management.

It is planted in rows 4 to 8 ft. apart, with 2 ft. between the plants in the rows.

New Type Cream Cooler For The Farm

By F. G. FEW,
Dairy Technologist.

Efficient cooling of milk and cream by farm refrigeration can aid greatly in the further improvement of butter and cheese quality. A new type of farm refrigeration system is discussed:

Following importation by the Commonwealth Government of a number of farm refrigerator cabinets and compressor units, one complete cabinet and three condensing units were made available for farm demonstration in this State. They were all manufactured in U.S.A., and are commonly known as "in-tank" coolers with "drop-in" condensing units. Installation on cream-producing farms was carried out during the winter months of 1956.

Actually, in America, these units are used for the cooling of both milk and cream, but, having regard to their size and the general farm requirements for refrigeration, they were considered most applicable to cream-cooling under Australian farming conditions. They also offered the possibility of a cheaper unit than those already available on the market for this purpose Use for milk-cooling would be quite feasible although no such tests were carried out with the units available.

The prefabricated metal cabinet, sufficiently large to hold six cans of cream of the 8-gal. size, with one of the "drop-in" condensing units comprised the cooling installation which was placed on the one cream-supplying farm. Arrangements were made to check cooling efficiency, cream quality and the general suitability of the equipment; observations being made over more than a year and covering the whole of 1957. By submetering the compressor unit it was possible to record accurately the power consumed over a full year, the actual cost of refrigerating the cream being deduced, by proportion, from the total power used on the farm and its cost.

With the two remaining condensing units, refrigeration was provided on another two cream-producing farms, the cabinets being built-in at the dairy premises. Plans and specifications for a farm-built cabinet were taken from an Agricultural extension bulletin compiled by the U.S. Department of Agriculture, together with a State University. In one instance submetering of the compressor was again arranged, thus allowing a cost comparison to be made between a farm-made unit and the factory-constructed cabinet already installed on another farm. The following particulars are given so that a satisfactory unit can be built by any farmer, builder, or contractor undertaking the job.

Construction.

Construction of the farm-built unit is made in concrete with a hardwood

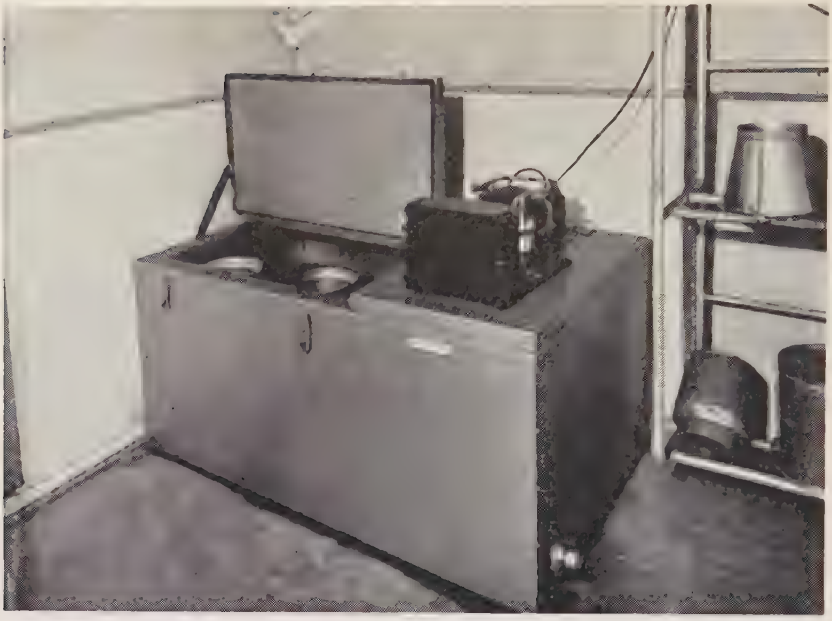


Plate 1.

American Factory-Built "In-Tank" Refrigerator.

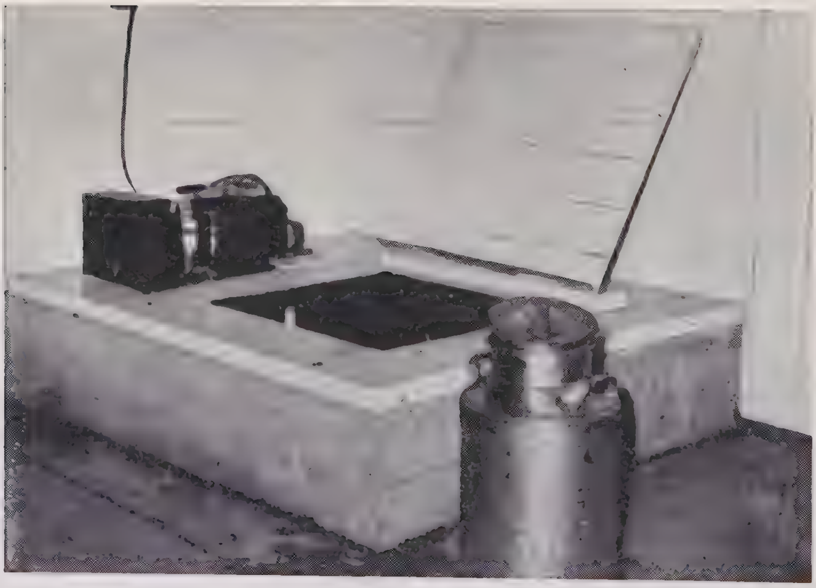


Plate 2.

Farm-Constructed Model of the American Prototype "In-Tank" Cream Refrigerator.

TABLE 1.

DIMENSIONS OF INSULATED CONCRETE COOLING TANKS.

Tanks are 36 in. wide, 27 in. deep inside.

Capacity in Number of 8 or 10 Gal. Cans.	Inside Length A.	Outside Length B.
4	4 ft. 0 in.	5 ft. 8 in.
6	6 ft. 0 in.	7 ft. 8 in.
8	8 ft. 0 in.	9 ft. 8 in.
10	10 ft. 0 in.	11 ft. 8 in.
12	12 ft. 0 in.	13 ft. 8 in.

TABLE 2.

MATERIALS REQUIRED FOR INSULATED CONCRETE TANKS.

Kind of Material.	Unit.	Amount of Materials Needed for Each Size of Tank.				
		4-Can.	6-Can.	8-Can.	10-Can.	12-Can.
Sand	cu. yd.	1·0	1·3	1·5	1·8	2·1
Gravel—¾ in. maximum ..	cu. yd.	1·1	1·4	1·7	2·0	2·3
Portland cement	bag	10	13	15	18	20
3 in. waterproofed insulation ..	sq. ft.	60	77	94	111	128
Tar paper (for cover)	sq. ft.	18	24	30	36	42
¾ in. x 6 in. boards (for cover) ..	lin. ft.	78	104	130	156	182
1½ in. x 10 in. boards	lin. ft.	30	38	46	54	62
1½ in. x 6 in. boards	lin. ft.	4	4	4	4	8

Add miscellaneous materials such as timber for forms, tar paper (where extra required), hinges, pipe and fittings, nails and screws, etc.

top that includes a hinged lid. The fixed top at one end serves as a rest for the compressor and cooling unit, a square hole being cut, through which the evaporating coil is passed when making the installation. A smaller square hole accommodates the separate motor-driven agitator to ensure water circulation within the cabinet.

Initially, the chosen site is excavated sufficiently so that the completed cabinet can rest approximately half above and half below the dairy floor level. This makes for easier lifting of the cans of cream, but makes the requirement of cabinet drainage a more difficult proposition.

Building the tank requires the use of both an inside and an outside form to contain the concrete, although the latter can be dispensed with where the tank abuts any walls of the dairy building. A thickness of suitable waterproof paper must, however, be placed against any such parts of the wall before the concrete is poured. The recommended mixture is 3:2¼:1, that is, 3 parts of gravel or crushed rock, 2¼ parts of sand and 1 of portland cement. None of the coarse material should exceed ¾ in. in size.

The concrete base is placed first and allowed to set and harden. The fill on which the base rests consists of cinders or coarse gravel about 6 in. deep. Base thickness is 4 in. and is made using a fairly stiff mixture which is levelled off to provide an even surface on which to lay the insulation. Rigid insulation of 3 in. thickness is used for the floor and walls and any recognised proprietary line should satisfy requirements. A material

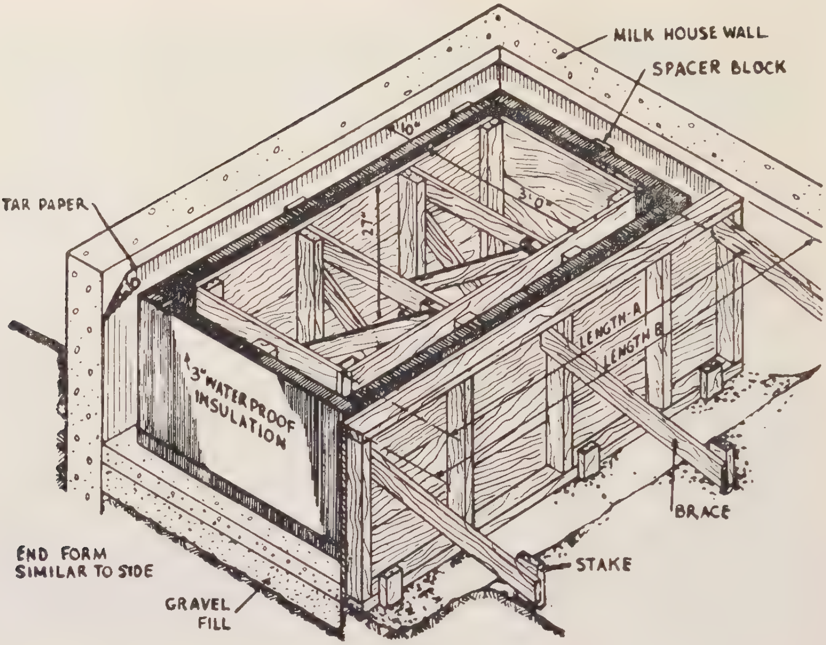


Plate 3.

Method of Forming the Insulated Concrete Tank.

immune to rotting is, however, desirable, and it must be waterproofed by dipping in hot bitumen. The wall insulation is erected after placing the floor insulation, care being taken so that the former will be exactly 4 in. from the outside face and 3 in. from the inner face of the tank. Provision for an overflow is made by fixing a length of 1½ or 2 in. piping in a horizontal position in the wall between the inner and outer concrete forms. Only a sufficient length to span this distance is required, although it can extend beyond the outer form if desired. A neat hole to accommodate the pipe must be cut in the insulation and the pipe should be heavily coated with bitumen along the portion between the forms. The pipe may be placed wherever convenient, which is usually above a point suitable for draining off the water which overflows. Its height is fixed to ensure that the water level is always constant, approximately shoulder height on the can.

Pouring of the concrete to form the cabinet floor and walls can now commence, particular care being taken to build the walls up evenly all around so that any displacement of the insulation is avoided. Thorough but gentle ramming is required to ensure smooth walls and dense concrete. When the forms are completely filled, ½ in. x 8 in. anchor bolts are set about 2 ft. apart around the top, the threaded ends projecting about 2 in. After the concrete has hardened and proper curing taken place, construction can be completed by adding the tank cover.

This cover is made, perferably, of a double layer of ¾ in. dressed hardwood boards with a thickness of heavy tar or other insulating paper between the layers. The layer of 1½ in. boards covering the 10 in. tank rim is bolted down using ordinary washers and square or hexagon ½ in. nuts. A thin layer of portland cement mortar is spread over the top of the wall before bolting down to secure a tight fit. The moveable tank cover is hinged to the wall cover using fairly heavy T hinges. A handle is fitted at the front for lifting, although the use of an overhead pulley and counterweight system is suggested to make the job easier. This is very simple to erect.

In some cases it may be found necessary to render all internal concrete sufaces with a rich cement—fine sand mixture incorporating a water-proofing agent with the mix. This is not required, however, if a thorough job is made of laying down the concrete, care in ramming down and avoiding the use of a too-large aggregate being the main points conducive to success. Particulars of construction are shown in Plates 3 and 4. Tables 1 and 2 give dimensions for various sized tanks and materials required.

The completed cabinet can be subsequently painted with a gloss, synthetic enamel to harmonise with the interior dairy walls, the underside of the tank cover being also treated to minimise moisture absorption. Provision for draining the tank can be made in several ways depending on circumstances. On sloping ground a drain pipe could be built into the bottom of the cabinet adopting similar principles as with the overflow pipe. Alternatively, the tank contents could be syphoned out, using a hose, when

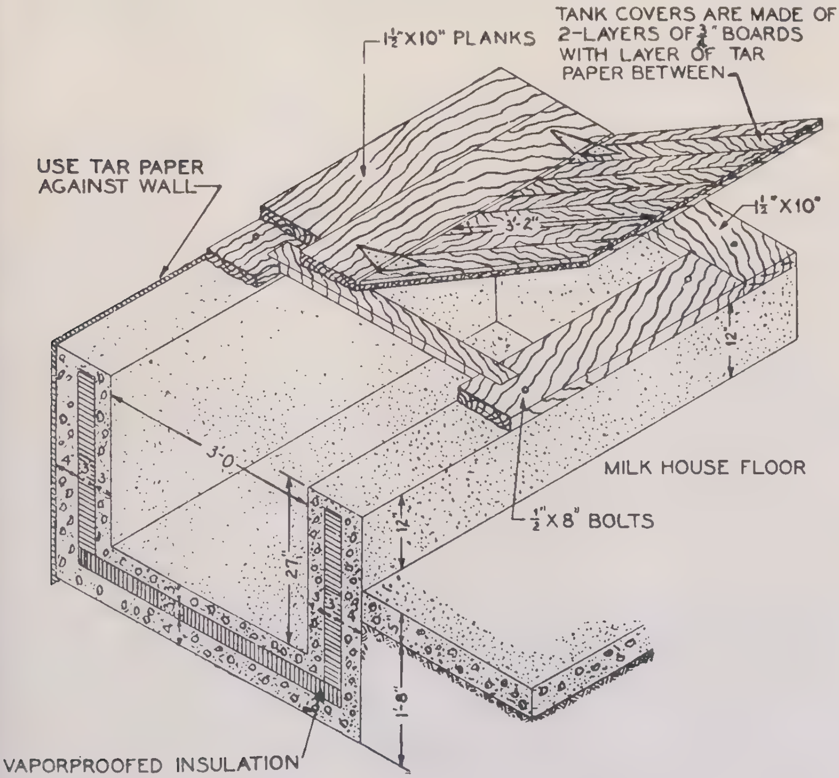

1½"X10" PLANKS
TANK COVERS ARE MADE OF 2-LAYERS OF ¾" BOARDS WITH LAYER OF TAR PAPER BETWEEN
USE TAR PAPER AGAINST WALL
1½"X10"
3'-2"
12"
3'-0"
27"
12"
4"
3"
5"
4"
1'-8"
MILK HOUSE FLOOR
½"X8" BOLTS
VAPORPROOFED INSULATION

Plate 4.

Details of Insulated Concrete Tank.

such a procedure is required. On level ground a ½ in. or ¾ in. centrifugal pump can be used, driven by the electric motor operating the cream seperator where applicable. Provision of a separate electric motor would not be warranted for such infrequent use. A drive from shafting used in the dairy shed is quite feasible but, as electric power must necessarily be available where the "drop-in" type of refrigerating unit is used, it is most likely that some convenient type of electric drive can be devised. Views of both the factory-constructed and farm-built cabinets are shown in Plates 1 and 2.

Results.

Observations made over the trial period leave no doubt as to the efficiency of both types of installation in preserving cream quality. Farm output in all cases was almost invariably of choice quality, although previously quite a percentage of lower grades had been noted. After several hours within the cabinet, cream temperatures were reduced to between 40 deg. F. and 45 deg. F., water temperatures varying from 34 deg. F. to 42 deg. F. On particular occasions, cream was only delivered weekly to the factory but no quality decline was noted as a result.

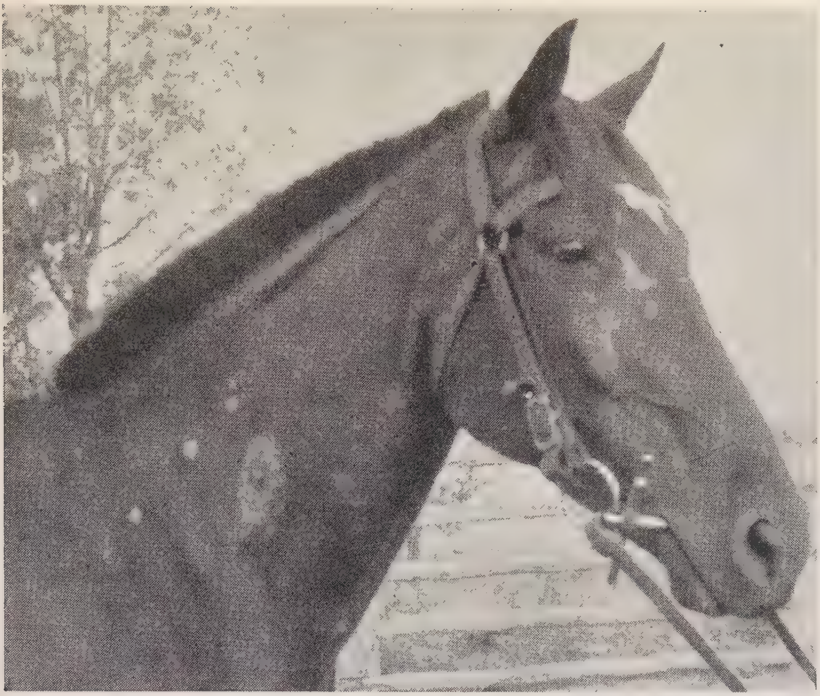
The farm-built insulated concrete tanks were made by contract for £72 each. Construction by the farmer would no doubt reduce this cost.

Although the prefabricated cabinet unit and the three "drop-in" condensing units were all of American manufacture, similar units are now being made in Australia. Complete units, that is, an immersion cooling cabinet and "drop-in" refrigerating unit, are available as well as either separately. For a farmer constructing his own concrete tank only the "drop-in" unit need be purchased. Installation is completed by merely plugging in to an ordinary 240 volt, single-phase, three-pin power point.

Running Costs.

So far as running costs are concerned, the recordings made on the two farms where units were submetered show the exact economic position. Cream was refrigerated for ·70 kw. hr. units per gal. in the prefabricated cabinet, the cost being 2.35d. a gal. Figures for the farm-built unit were ·58 units a gal. of cream costing 2·0d. The difference was mainly due to the considerably higher production of the latter farm and not a superior efficiency of the farm-built tank unit. Equal efficiency, can, however, be justly claimed. Milk cooling would be still cheaper per gallon although this point was not demonstrated with these particular units. Submetering of two other farm refrigerators, the type being already available in this State, showed that milk was being refrigerated for ·16 kw. hr. units a gal. at ·62d. Cream cooling consumed ·68 units a gal. and cost 2·7d. Production on both these farms was, however, somewhat small. All figures can be combined and costs quoted at 2d. to 2¾d. per gallon for cream and at something around ½d. to ¾d. a gal. for milk. Further trials would, doubtlessly, result in figures outside the ranges given and probably lower in the case of farms with a relatively large output. Those quoted should, however, effectively dispel any fear that cream and milk quality cannot be preserved economically by the application of refrigeration on the farm.

* * *



Ringworm is Infectious

THIS horse has ringworm.

You can see the hairless, crusty, roundish spots, large and small, down the side of the neck from the angle of the jaw to the shoulder.

This is an infectious disease. It's unsightly, worrying to the horse, and may be transmitted to man.

Treat it as soon as it crops up. Clip the hair short around the spots and then wipe the areas with 2 per cent. tincture of iodine. Don't rub it in or it will "blister"; just wipe it on with cotton wool.

Some cases don't respond to this treatment. If you have this experience, seek veterinary advice for further treatment.

Wheat for Pigs

"M.C.," of Rosewood, seeks a suitable variety of wheat for grain production for pig feeding. He asks when to plant and inquires if the crop can be grazed during the growing period.

Answer: There are two varieties of wheat which should be suitable for this purpose; they are Lawrence and Celebration. Both are good performers as dual purpose wheats.

Plant the varieties mentioned, in May, and under favourable growing conditions they will provide a good period of grazing prior to shutting up for grain production.

Dairying Success With Continuous Feed Supply

By J. B. WILSON,
Dairy Officer, Boonah,
and A. HUTCHINGS,
Senior Adviser in Cattle Husbandry.

A high level of production has been achieved by a Roadvale (Boonah district) family, whose 53 cows have averaged 700 gal. of milk and 258 lb. of butterfat. The key to their success has been that they have used every available method of providing a continuous supply of feed to their herd, rather than go in for maybe one or two spectacular feeding practices.

In 1923, Mr. and Mrs. W. A. Dull purchased the property which now forms part of the 521 acres they own at Roadvale. The area is rather hilly and consists of about equal areas of brigalow scrub and grey leaf ironbark country.

In their early years on the property, Mr. Dull and his son, Herb, did contract work in the district. At the same time they developed their farm. Today, they are reaping a reward for their hard work and enterprise.

PRODUCTION.

Mr. Dull and his son joined the district herd recording group when it first started. Production of their grade A.I.S. herd has been built over the years, as shown in Table 1.

Increasing production reflects improvement in husbandry and feeding.

Production records are used beneficially. Milking cows are divided into four groups based on butterfat yields, and concentrates are fed

TABLE 1.

——	50/51.	1952.	1953.	1954.	1955.	1956.	1957.
Average Butterfat per Cow (lb.)	166	129	182	184	..	259	258
No. of Cows	43	42	42	30	..	56	53
Average Butterfat First Calf Heifers .. .. (No. of heifers in brackets)	.. ..	68 (6)	.. ..	148 (8)	.. ..	182 (10)	192 (8)

Plate 1.

Young Lucerne Growth Provides High Quality Grazing.

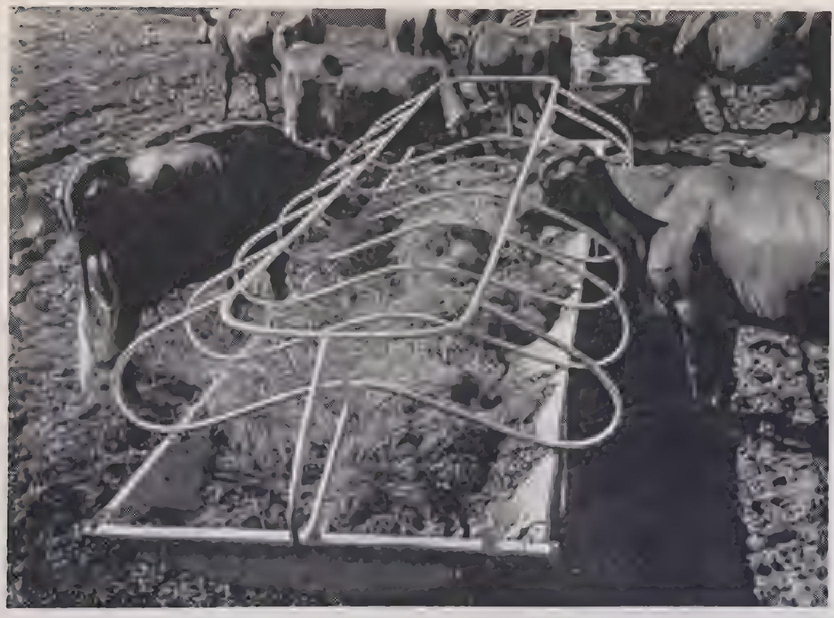


Plate 2.

Home-Made Portable Feed Troughs. Each trough has space to feed sixteen cows.

accordingly. Low producers are culled and heifers reared from the highest producers. A dozen heifers are reared each year. At the time of writing this article (September), 25 cows were producing 114 gal. of milk daily.

FEEDING THE HERD.

The property is divided into 30 paddocks and plans are afoot for much more fencing. Cropping is used extensively in providing a continuous supply of good quality feed for the herd.

Altogether, 340 acres have come under the plough, and 70 acres have been planted to lucerne. Last season, 80 tons of lucerne hay were made. Lucerne is systematically grazed when not shut up for hay. The life of lucerne on brigalow scrub is about four or five years. It is then ripped with a heavy-tined implement and oversown with oats in winter and sudan grass in summer. This is grazed off. A minor problem at this stage is that cows pick out the crop and leave the lucerne. However, other stock eat the lucerne later on.

Plate 3.

Fodder Storage—the Labour-Saving Way.

Following the final grazing, the paddock is ploughed and a seed bed prepared for wheat. This is followed, in season, with corn and sorghum for three years. It is then replanted to lucerne.

To date, lucerne has not successfully been established on forest country.

As a grass-clover pasture has not yet been established, 40 acres of suitable crops are grown both summer and winter for grazing off. These crops are planted within reasonable walking distance of the bails, while crops for conservation are grown in the paddocks farther away. Thus, long daily walks by the milking herd are avoided.

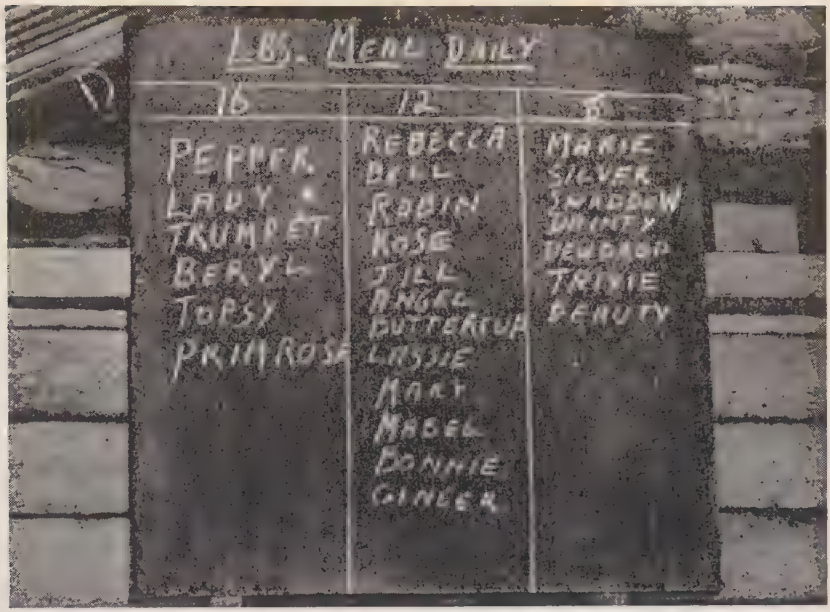
During the past summer, two silos of 400 tons and 300 tons capacity were filled with sorghum silage. Home-made attachments enabled harvesting of a 12 ft. crop, which had fallen flat to the ground. A home-made, 6 tons capacity trailer with an ingenious unloading device has helped the silage making.

Storage has been built for 300 tons of hay. This shed is never empty. A galvanised iron tower silo has been built to hold 60 tons of grain. This will often be full but rarely empty.

About 100 acres of sorghum and 130 acres of wheat are harvested for grain.

Grazing of lucerne is supplemented with silage and lucerne hay, fed in well-constructed, portable troughs. A concentrate mixture is made of gristed sorghum, wheat and meat meal, with the addition of 1 per cent. bone meal. The proportion of meat meal is reduced from $\frac{1}{5}$ to $\frac{1}{8}$ of the mixture when lucerne grazing is plentiful.

Mr. Dull plans to introduce a roughage feeding system of silage and lucerne hay to supplement lucerne and crop grazing for the dairy herd, ewes, and lambs.



LBS. MEAL DAILY

16	12	8
PEPPER	REBECCA	MARIE
LADY	BELL	SILVER
TRUMPET	ROBIN	SHADOW
BERYL	ROSE	DAINTY
TOPSY	JILL	DEWDROP
PRIMROSE	ANGEL	TRIXIE
	BUTTERCUP	BEAUTY
	LASSIE	
	MARY	
	MABEL	
	BONNIE	
	GINGER	

Plate 4.

This Blackboard in the Milking Shed Sets out the Meal Allowance for Each Cow.

Plate 5.

Sheep Eat What the Cows Leave and Turn It Into Cash.

MILKING PRACTICES.

Two operators handle the four-unit, doubled up machines, and no time is lost. Cows are fed concentrate, in proportion to their production, while being milked. A black-board placed at the end of the bails shows each cow's ration at a glance. Feed hoppers and boxes are fixed in each dummy bail.

Cows walk into the bails without being driven. Milk "let down" is stimulated by udder washing. To protect quality, chlorine sterilizing solution is added to this water. Machine stripping is practised. An average of close to 300 lb. of butterfat for mature cows disproves the old story still often encountered "that cows will dry off if not hand-stripped after machine milking."

Controlled mating is used for all cows except the "tail enders" and calvings are planned for June, July, and August. Very little infertility has been encountered.

Failure to come on heat is not a herd problem on this property, mainly because cows are always well fed.

MIXED FARMING.

Twenty farrowing sows are kept and from 150 to 200 baconers are sold each year. All pig feed except meat meal is produced on the farm.

Two years ago, 160 crossbred ewes, a Southdown and a Dorset horn ram were brought on to the property. The general practice is that sheep follow the dairy herd in all grazing. Thus most crops are closey grazed. Fat lambs and wool are sold.

Cattle, sheep and pigs contribute to maintain soil fertility and butter, wool, bacon and lambs are the products sold off the property.

MACHINERY.

A number of implements has been designed and built by Mr. Herb Dull. He is also skilled in machinery maintenance work.

An electric welding plant is used to great advantage in construction of trailers, gates and for repairs to farm equipment. This has provided substantial improvements at reasonable cost.

A forage harvester, hay baler, header, and a full complement of rugged cultivating machinery, together with ample tractor power, provide the means of handling most soils and crops.

While its capital value is high, this machinery ensures that planting and cultivation can be carried out at the most opportune time. Likewise, crop losses are cut because enough machinery is available to handle the material quickly.

Velvet Bean v. Reeves Cowpea

"K.A.," Caboolture, has inquired about the relative feeding values of velvet bean and Reeves cowpea.

Answer: There is little, if any, significant difference in the feeding value of the two crops. Reeves cowpea is susceptible to stem rot as is Poona cowpea. As this disease destroyed much of a previous planting of Poona the probability of Reeves cowpea being similarly affected commends a change to velvet beans. Velvet beans are frost-susceptible and so should not be planted until the danger of frost has passed. This bean has a much longer growing period than the cowpea and would need to be planted as soon as the danger of frosts had passed in order to get the best results. There are, however, stem-rot-resistant cowpea varieties and seed of these is being multiplied for release to farmers.

Dairy Parade

THE coming of summer underlines the need for an adequate and good-quality water supply on every dairy farm.

Most of the defects that reduce milk and cream quality occur in the summer, but they can be reduced almost to insignificance by paying strict attention to hygiene.

This is the time of the year to look after your storage facilities so that sufficient water can be held at the dairy shed. Storage for at least 2,000 gallons is a must at every dairy shed. A few hours spent repairing and cleaning guttering and roofs will allow the greatest possible quantity of water to be stored from summer rains. Your work on this job will pay for itself many times over in top prices for good quality produce. In addition, don't overlook the need for sufficient stock watering points in your paddocks.

—*W. D. MITCHELL,*
Dairy Technologist.

DAIRY refrigerators are becoming popular items of equipment in dairy buildings in Queensland. Normally, they give little trouble. One fault, however, is that the machine may run for an excessively long time. When this occurs, it suggests one of the following faults in the operation of the unit.

1. A low gas charge. This requires examination by a qualified mechanic to check the unit for leaks, and re-charging if necessary.

2. The refrigerator may be overloaded due to the farmer's failure to cool the milk sufficiently over a cooler before filling the can.

3. Insufficient water in the immersion type cabinet.

4. Insufficient ventilation around the compressor unit restricting the amount of air draught passing around and through the cooling fins.

5. Faulty rubber seals on the cabinet door allowing cold air to escape from the unit.

—*K. FITZGERALD,*
Dairy Officer.

UNSATISFACTORY dairy hygiene during the summer and autumn is the main cause of flavour defects in milk and cream.

At this time of the year it's necessary to pay close attention to cleaning the milking equipment and maintaining it free from milkstone. The acid-alkali type of cleansers are valuable aids in cleaning. Regular cleaning after each milking cannot be neglected. Boiling water, steam or chemical sterilizing solutions must also be used to finish the job of cleaning equipment.

Dirty udders and flanks on the cows are a potential source of dust and manure contamination of dairy produce. Udders and flanks should always be washed if defects from this source are to be avoided.

Inclusion of aged or stale milk in the cans, mixing hot and cold cream, and failure to stir cream thoroughly will all contribute to quality deterioration.

Faulty cooling or lack of cooling makes it difficult to produce choice grade quality consistently.

—*J. ARMITT,*
Dairy Officer.

Stock Gazette

WITH blowfly offering resistance to insecticides in increasing measure the cautious woolgrower will review the position in regard to his own flock. It might be worth trying to lessen the impact of the blowfly problem in the following ways:—

1. When picking replacement rams to make sure to get flock rams that are plain bodied, particularly in the breech area.

2. To carry out the Mules operation on all young sheep, both ewes and wethers, annually, so as to carry no sheep that have not been Mulesed.

3. To make sure that all lambs are marked with the most suitable tail length to resist fly; vulva length in ewe lambs and a similar tail cut in wethers.

4. By more careful supervision at shearing and crutching to ensure that tags of wool are not left around vulva or at tail-end.

—R. B. YOUNG,
Senior Adviser in Sheep and Wool.

Timely Tips for March

MARCH may see you in trouble with cases of footrot cropping up in your herd. Correct treatment is very effective early in the disease. When the infection has advanced it can be crippling. You can do a lot to stop its spread in the herd. See your veterinary surgeon for details.

If you see pigs with foot trouble, roughly like footrot in cattle, remember that pigs sometimes get footrot too. It responds very well to treatment.

Pleuro (contagious bovine pleuropneumonia) can be controlled by vaccination. With the mustering season starting in the next month or so, now is the time for cattlemen to start making arrangements to vaccinate.

Any unexplained unthriftiness of cattle should be investigated by a veterinary surgeon. Copper deficiency could be involved, especially if unthriftiness, black scour or yellowing of the coats of red coloured animals is seen. If the veterinary surgeon sees signs of copper deficiency he will take blood samples to check for copper.

Grasses will soon start to deteriorate as autumn comes on. Signs of phosphate deficiency may be seen more clearly when this happens. Watch for "bone chewing," rough coats, lameness and loss of condition. If you already know you have a phosphate deficiency on your place feed bonemeal (at least 2 oz. per head per day). Make inquiries from your nearest Agriculture and Stock office too, about other ways of rectifying phosphate deficiency.

Remember that calcium (chemical symbol Ca) and phosphorus (chemical symbol P) are two different minerals. In many ways their action in a cow's body is opposed. If your cows are phosphate deficient put it right with a supplement that is high in phosphate (P).

Farmer's Guide To Genetics And Breeding

By B. W. MOFFATT,
Adviser, Poultry Section.

POULTRY breeding practices are now receiving more attention than ever before in the history of the poultry industry. It has been realised that one of the best avenues open for improving the efficiency of egg production is through breeding. This also applies to other industries, such as the dairy industry, where testing of herds has shown that the best producers can be identified and bred from to improve the herd. In respect to poultry, the random sample tests conducted in Queensland and elsewhere have shown the wide variation in the performance of stock from different hatcheries.

In the case of the poultry industry, eggs and meat have many competitors for the housewife's purse. For this reason we are always ready to adopt improved techniques to "keep up with the times."

In the past few years many poultry breeders have realised that their breeding practices left much to be desired, for egg production per bird per year has not increased significantly over the past decade. Over this period, production costs have risen steeply and only by increased production per bird, can the poultry farmer gain a satisfactory reward for his labour and on his investment.

That breeders realised this need for improvements is shown by their enthusiasm in the recently introduced Queensland Poultry Improvement Plan (Q.P.I.P.). This is a scheme aimed at increasing efficiency of production by breeding fowls that will live longer and lay more eggs than did their predecessors. For breeders to understand the basic facts of the scheme and buyers of their chickens to have faith in the scheme it is considered essential to have a basic knowledge of genetics, which is the study of heredity.

What is Inherited.

No two people are exactly alike. Although it is not quite so obvious, the same applies to fowls and other animals. This is a basic point in any breeding scheme. This variation allows us to select the better individuals and breed from them. What are the principles behind this variation?

Many characters of economic importance, for example, body weight and egg size, are governed by many genes, which are carried on chromosomes in the body cells. These genes are passed onto the progeny, from the mother in the ovum, and from the father in the sperm, as ova and sperms are the only physical particles connecting one generation with the next. These genes start a chain of processes which eventually result in the character expressed.

In other words, the character is not actually inherited, but the animal

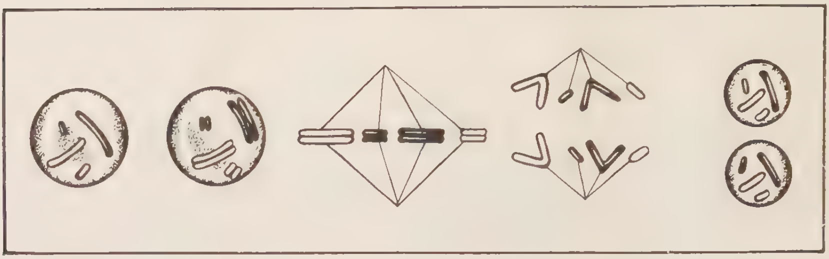


Plate 1.

Mitosis in Diagram Form. The original cell has four chromosomes which have shortened and thickened. The chromosomes divide into two chromatids and attach themselves to the spindle fibres at the "equator". The chromatids separate and travel to opposite ends of the nucleus. Thus two cells are formed with the same chromosome complement as the original cell.

inherits something which gives it the ability to express that character. This can be easily explained by the fact that sperm and ova from black cockerels and pullets, for example, Black Australorps, are not black. However, genes carried in these cells are capable of starting a biochemical process in the progeny, which will produce a black pigment, and so a black chicken. Most of the individuality of animals is inherited in this way. We can see from this that if a bird is a particularly good layer she has probably inherited certain genes from her parents which govern many of her body processes in such a way as to give her the ability to lay many eggs.

Environment's Part.

By environment is meant rearing conditions, housing, feeding and climatic conditions. What has been said about inherited characters is not the whole story. For instance, take the example of the hen that inherited from its parents the ability to lay many eggs. If this hen had been subjected to adverse rearing conditions or had not been fed properly, it certainly would not have laid many eggs.

It has often been said that 90 per cent. of the breeding goes down the throat. In other words, if the animal is not fed properly (and housed in good quarters) no matter how good its breeding, it will not produce efficiently or to its inherited capacity. Which then is more important, heredity or environment? We cannot choose, for they are so interwoven that only by a combination of good management with well-bred stock can best results be achieved. Too often people blame the hatchery for their own poor results. One farmer who had purchased chickens from 20 different hatcheries claimed that the Department should close them all down because of their poor class stock. Investigation of his complaint soon showed that his management would prejudice the successful rearing of any chickens.

This brings us to the concept of heritabilities. The heritability of a character is often closely associated with the environment under which the progeny have been reared. However, characters such as the black pigment in Australorps do not depend on environment. They will show up no matter what conditions prevail.

There are other characters such as body weight, egg production and egg size, that do depend, to a large extent, on the feeding and rearing practices. In such cases the heritability of a given character can be expressed as that fraction of the superiority of the parents over the flock from which they were selected, that is passed on to their progeny. If a group of parents averaged 10 units better than the average of the flock, and the progeny were also 5 units better, then the heritability of that character would be 50 per cent. This is regarded as a high heritability.

Heritability of "livability" (the ability to live) is very low (about 5 per cent.), and therefore, whether the bird lives or dies depends much more on the environment than it does on the genes the bird inherited. For this reason, breeding from hens instead of pullets gains very little in the way of "livability". In fact, it slows down the rate of progress because of the longer generation interval. The heritability of hen-housed egg production, that is, the total production of a pen divided by the original number of birds penned, is also low, being about 16 per cent. The reason for this low figure is because hen-housed production takes mortality into account and also the number of eggs laid by a bird is governed to a large extent by its environment.

Physical Basis of Inheritance.

The study of genetics is often made difficult for the average person by the use of many technical terms. However, for a basic study this can be overcome by explaining them as they occur.

To understand how genes and chromosomes are passed on from one generation to the next, it is necessary to know a little about the basic structure of the body cell.

The Body Cell.

The body of an animal is made up of millions of small living units called cells. These vary in size, shape and complexity, but basically are about 1/2,500th of an inch in diameter. Numbers of these cells with similar

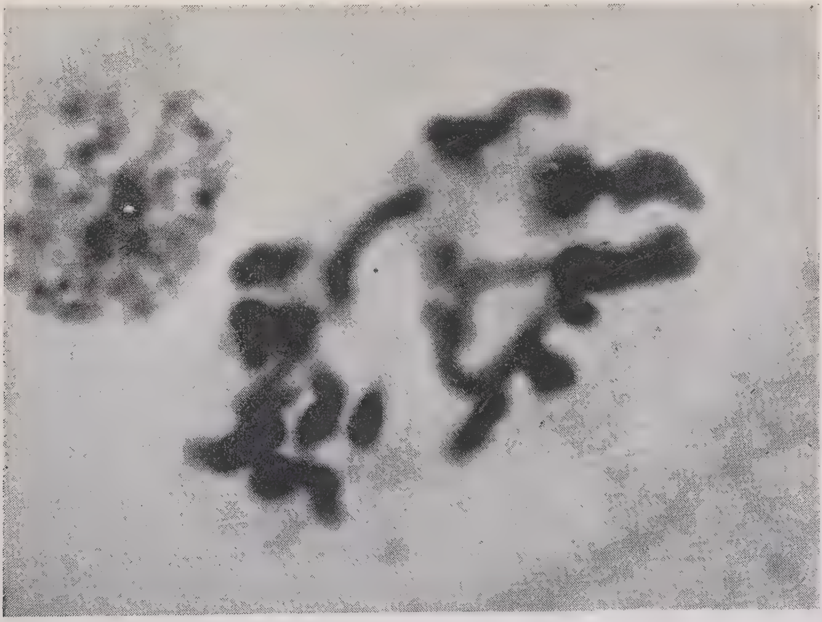


Plate 2.

The Chromosomes of a Sperm Mother Cell (Magnified 1,500 Times) in the Process of Mitosis. These chromosomes are arranged at the equator. The spindle fibres are not shown.

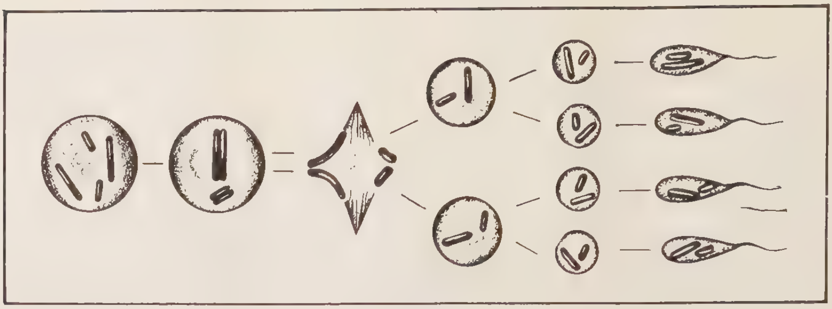


Plate 3.

Meiosis or Reduction Division in Diagram Form. The chromosomes pair and become arranged at the equator. The members of each pair separate and go to opposite "poles". Two cells with the haploid number of chromosomes result. The second meiotic division results in four cells each with the haploid number of chromosomes.

functions are held together to form a tissue. A number of tissues associated with one another, form organs such as the liver, muscles, bone and skin, and these in turn make up the whole of the body structure.

A single cell consists essentially of a drop of protoplasm, limited by a membrane. This protoplasm actually consists of two major parts, the cytoplasm towards the outside and a denser part in the centre called the nucleus.

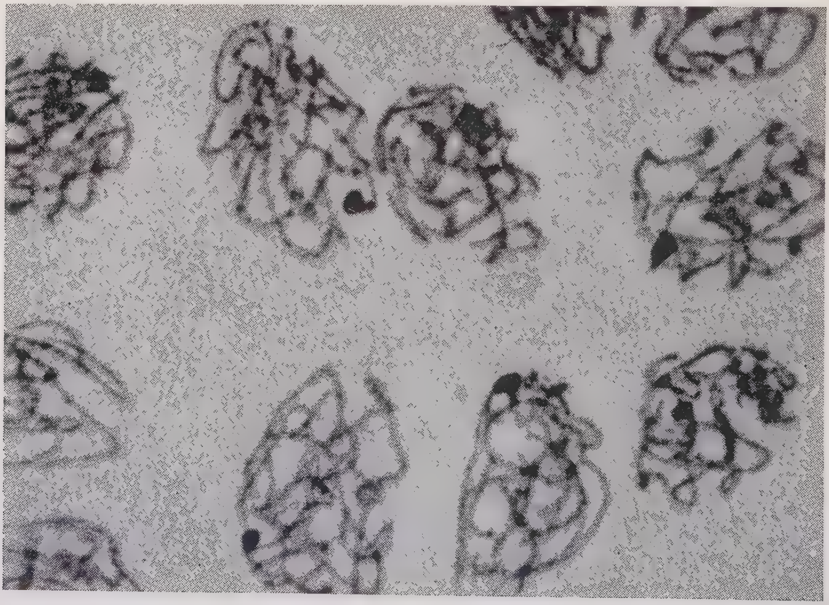


Plate 4.

A Section of a Grasshopper Testis Magnified 600 Times Showing Chromosomes Still in the Elongated State in the Early Stages of Cell Division. Each lot of chromosomes shown is the full complement for one cell but for the sake of clarity the cell wall and cytoplasm have not been stained.

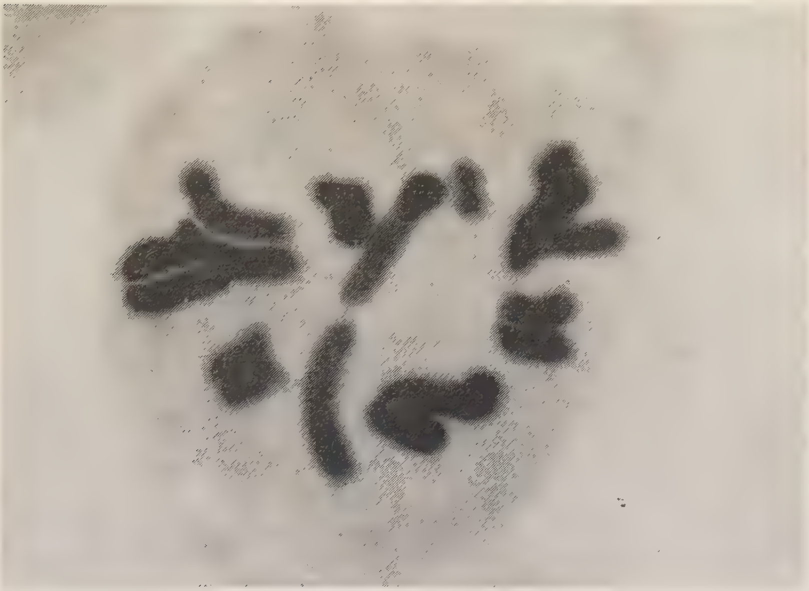


Plate 5.

A Single Cell (Grasshopper Testis Magnified 1,800 Times) in the Process of Meiosis Showing the Arrangement of Chromosomes at the "Equator". Notice that the members of a pair have come to lie side by side so that when they separate one member of each pair will travel to each end of the cell. Compare with Plate 2 (Mitosis) to see that the chromosome number is halved by meiosis.

It is the nucleus in which we are mainly interested because it contains the chromosomes and genes.

These body cells are capable of dividing into two and so growth of the animal occurs. Actually the animal starts from the fusion of the sperm and the ovum and this resultant cell starts to divide so that one cell gives 2, then 4, 8, 16, and 32, and so on until the whole structure of the animal is completed. In the adult animal, cell division still goes on to replace those cells which are worn out.

Chromosomes and Genes.

In the nucleus of each body cell are located the chromosomes and, on these, the genes. For simplification, the chromosome can be regarded as made up of the organic substances, protein and nucleic acids. They are capable of elongation and contraction and when fully contracted look very much rod shaped. These chromosomes can be quite easily seen if cells are properly stained and examined under a microscope.

The number of chromosomes in each cell is constant in each species of animal. The numbers vary greatly in different animals from 2 in the parasitic large round worm (Ascaris) up to 200 in the crayfish. With high numbers it becomes difficult to count these small bodies and only recently it was found that there are 46 in man and not 48 as previously thought. The number in fowls has not been counted accurately but it is thought that there are 78 in the male and 77 in the female. This difference in number between the sexes is associated with the inheritance of sex which will be referred to later.

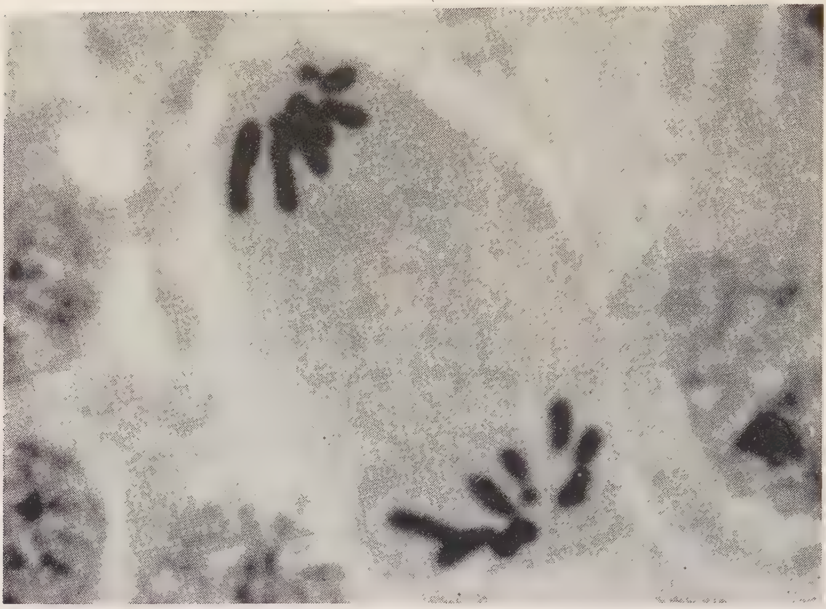


Plate 6.

Cell Division (Meiosis) Nearing Completion Showing That the Members of a Pair of Chromosomes Have Separated. Each lot of chromosomes will form a new nucleus. A cell membrane will form across the centre and two cells will result (Grasshopper testis magnified 1,080 times).

The genes are too small to be seen with even the best microscopes but from a number of lines of evidence it is now believed that they are probably composed of the organic substances called D.N.A. for short by geneticists. Each gene is situated at a definite point on a particular chromosome. Much breeding work has been done on the so-called fruit fly *Drosophila melanogaster* (not to be confused with the well-known parasite of fruit) which has only 4 chromosome pairs, and it is now possible to compile chromosome "maps" of the fly to show the actual positions of the genes in relation to the length of the particular chromosome on which they are located.

If we study the full complement of chromosomes for an animal we find that they can be arranged in pairs, each member of the pair being exactly like its mate. Each pair is termed an homologous pair. There is of course the exception in the hen where there are 77 chromosomes. In this case there are 38 pairs and one single one in the female, and 39 pairs in the male.

As the genes are located at definite points on the chromosome, and as the chromosomes can be arranged in pairs, it can be seen that when the members of a pair lie side by side there will be, at any particular point two corresponding genes opposite one another. The point where they are located is called a "locus" and the pair of genes which affect the one character are called "alleles." These two genes or alleles can be of the same kind or they can be different. If they are different, one is sometimes dominant over the other, which is then called a "recessive." The resultant character which they affect or govern will then be determined by the dominant one. The recessive character will only show if both of the genes are recessive. Where an animal carries two genes of the one kind at a particular locus (either both dominants or both recessives) that animal is referred to as being homozygous, and will breed true for that particular character. If on the other hand it carries one dominant and one recessive it is referred to as heterozygous for that character.

Very few characters are actually governed by only the one pair of alleles but to simplify matters we will give an example. In a fowl with a rose comb there would be two chromosomes, each carrying a dominant gene for this character. We could denote this bird RR. In a single comb fowl there would be two chromosomes each carrying a recessive gene for rose comb which could be denoted rr. Both of these birds are homozygous, but one is homozygous for rose comb and the other is homozygous for single comb, the recessive of rose comb. The genetic make up of these birds or genotype, as it is called, is RR and rr respectively, and the appearance or phenotype is rose comb and single comb respectively. If these two birds were mated, a bird would result with a genotype of Rr (heterozygous), which has a phenotype of rose comb, because R is dominant to r.

This is all very well, but you might ask how do these genes pass from parent to offspring so that each parent contributes one gene. The answer lies in the division of the body cells and the formation of sperm and ova.

Division of Cells.

There are two types of division of cells. The first type is called simple division or mitosis and goes on in all the body cells after the fusion of sperm and ova. This type of division results

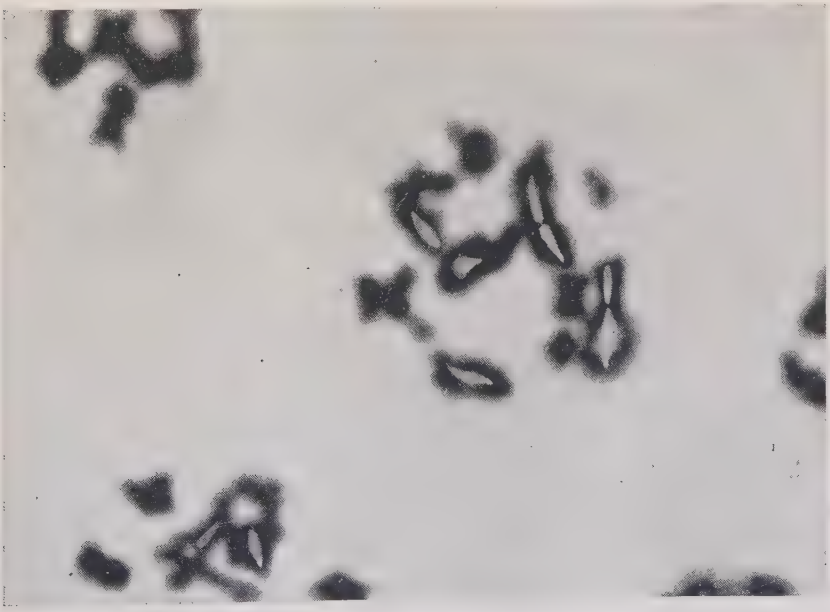


Plate 7.

Chromosomes Magnified 1,230 Times in the Process of Meiosis at the Stage Where Crossing Over Occurs. Members of a pair can be seen to be joined in places along their length. Crossing over takes place at these points as in Plate 8.

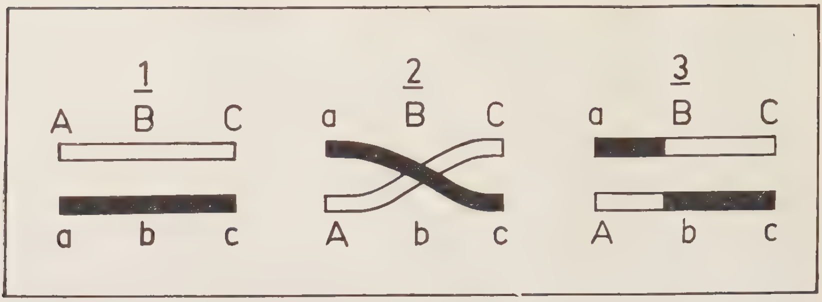


Plate 8.

A Simplified Version of Crossing Over, Which Will Result in New Combinations of Genes.

in the millions of cells that go to make up the animal. It really consists of exactly duplicating the cells. The second type of division, meiosis, is associated only with the formation of the sperm and ova in the testes and ovary respectively. From a genetic point of view this is the important division but so that it can be understood more fully both are described.

Mitosis or Simple Cell Division.

If a resting cell (one that is not dividing) is examined, we find that the nucleus looks like a mesh of not-clearly-defined threads. These threads are really the elongated chromosomes but their shape cannot be made out clearly. As the cell starts to divide the chromosomes contract in length and appear as rod shaped bodies. See Plate 1. About this stage, two "poles" appear, one at each end of the nucleus. From each of these "poles" a number of fibres can be seen radiating out and joining with those of the other "pole" so that we have a number of complete fibres from one end of the nucleus to the other. These are called "spindle" fibres because they are shaped like a spindle.

Each chromosome then becomes attached to one of these fibres at about the centre of the nucleus, often called the "equator." See Plate 2. Each chromosome then divides into two chromatids. Actually it reproduces itself so that there are two complete sets of chromosomes. The separation of the chromatids then takes place. They move along the spindle fibres towards the "poles," one chromatid of each pair going to each "pole" to become a chromosome of that cell. The spindle fibre system then disappears and a membrane forms across the centre of the cell to make two cells. Each cell thus contains the full number of chromosomes, which then begin to elongate, lose their shape and show the mesh-like structure of the resting cell.

If sperm and ova were formed as a result of mitotic division, each would have the full complement of chromosomes or as we say, the "diploid number" (78 in male fowl and 77 in female). When sperm and ova fused we would get 155 chromosomes. It is quite obvious that this process could not go on because after a few generations the chromosomes would fill the cell. For this reason nature has provided meiosis.

Meiosis or Reduction Division.

Meiosis consists of two distinct divisions but for all practical purposes the second division can be regarded as simple mitosis. In effect, the first meiotic division is concerned with the reduction of chromosome numbers to half, often referred to as the "haploid number" of chromosomes. See Plate 3.

The stages of meiosis are similar to those of mitosis except for a few technical details. In the first stages, the diploid number of chromosomes (78 in the male fowl) can be made out as long threads in the nucleus of the cell. See Plate 4. Then each member of an homoglogous pair is seen to come together side by side so that only the haploid number (39 in the male fowl) can be made out. See Plate 5. The spindle fibre system appears and the pairs attach to the fibres. Now instead of each chromosome dividing into two chromatids, one member of each pair goes to opposite "poles" of the cell to give only half the number of chromosomes (39) at each "pole." See Plate 6. As these chromosomes pull apart to travel to the "poles" it is noticed that they stick together at certain points. Actually what has happened here is that one small part of a chromosome has changed places with the same part of the other chromosome. This is called crossing over and it results in the "mixing up" of genes. See Plates 7 and 8. Thus each chromosome, although it still has the same number of genes as before, may get different genes, and so result in new combinations of genes, and hence more variation in the progeny, if this cell goes to make up a new individual.

When this first meiotic or reduction division is complete the cell divides again. This is called the second meiotic division and is similar to an ordinary mitotic division. This time the cell only has the haploid number of chromosomes (39) but they divide into chromatids and one goes to each "pole" of the cell. Each resulting cell has the haploid number (39). It can be seen that from these two meiotic divisions, four cells with the haploid number of chromosomes will result. This is how sperm and ova are formed with only half the chromosome number so that when a sperm and an ovum fuse the diploid number will be restored.

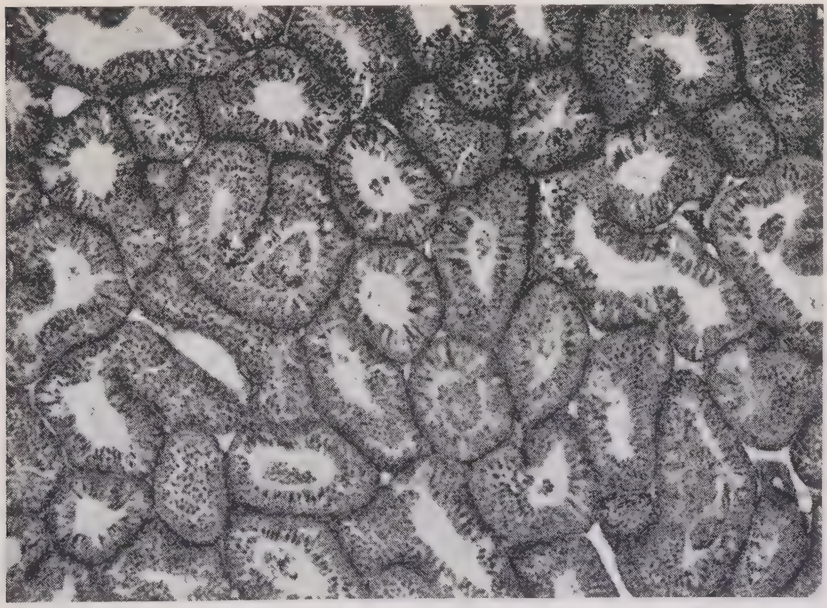


Plate 9.

A Section of Fowl Testis Magnified 200 Times to Show the General Arrangement of Seminferous Tubules.

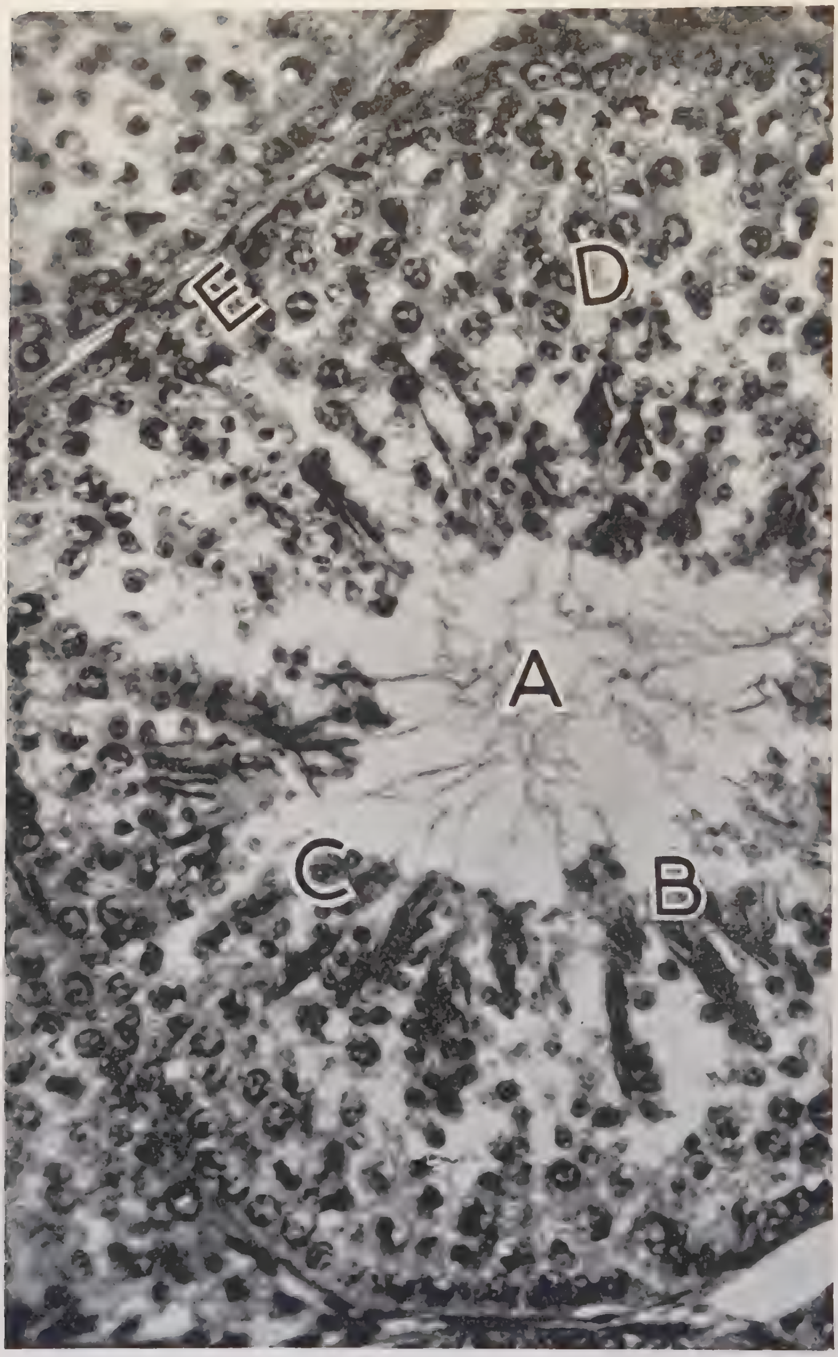


Plate 10.

One Seminiferous Tubule from Plate 9 Magnified 650 Times to Show Greater Detail. (A) Duct into which sperm are released. (B) Bundles of newly formed sperm. (C) The small cells are spermatids from which sperm are formed. (D) The larger cells are the primary and secondary spermatocytes which give rise to the spermatids by meiosis. (E) The sperm mother cells on the edge of the tubule give rise by mitosis to the primary spermatocytes.

Formation of Sperm.

To give a practical example of these divisions, we will refer to the formation of sperm in the testes of the cockerel. The tissues of the testes are arranged into a number of tubes called "seminferous tubules." See Plate 9. Actually they are very small and can only be seen with the aid of a microscope. Around the walls of these tubes are situated the sperm mother cells—cells that eventually give rise to the sperm by division.

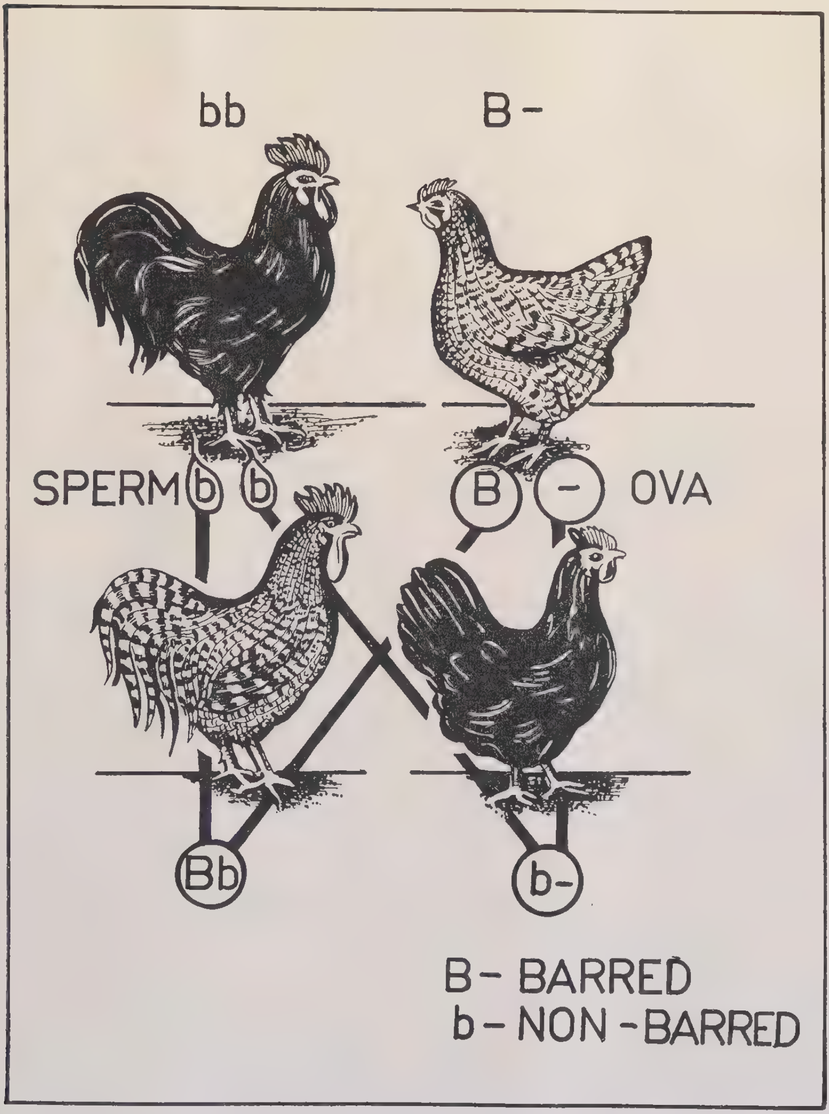


Plate 11.

A Cross Between a Non-Barred Male and a Barred Female Gives Rise to Barred Male and Non-Barred Female Progeny. This is a case of sex linkage where the female progeny inherits no gene for barring from the mother.

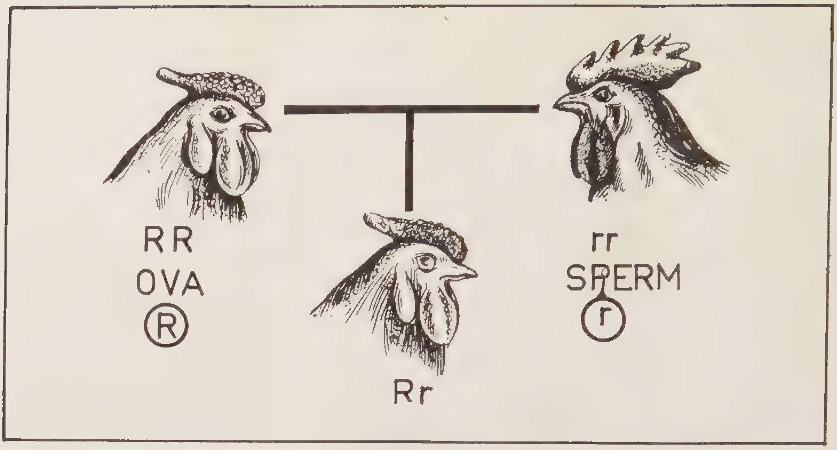


Plate 12.

If a Rose Comb Bird (RR) and a Single Comb Bird (rr) are Crossed, all the Progeny Will Be Rose Comb (Rr).

The sperm mother cells divide by mitosis or simple division to give cells with the diploid number of chromosomes. These cells are called primary spermatocytes and divide by meiosis or reduction division to give secondary spermatocytes with the haploid number of chromosomes. This is the first meiotic division. These secondary spermatocytes then undergo the second meiotic division (actually mitosis) to give spermatids. The sperm are then formed from these spermatids. See Plate 10. The production of ova in the female is similar except that where four spermatids are formed from one primary spermatocyte in the male, only one functional ovum is produced from the primary oocyte in the female and the other three, called "polar bodies" degenerate and are lost.

How Sex is Inherited.

With our basic facts thus far established, it is not difficult to understand the inheritance of certain simple characters. The inheritance or determination of sex is also relatively simple so it will be discussed here.

As we have already learned, the cockerel germ cells or sperm carries 78 chromosomes and the pullet 77. This could also be put another way. We could say that the cockerel carries 38 homologous pairs plus 2 sex of X chromosomes. The pullet would have 38 homologous pairs plus one X chromosome. When sperm are formed in the testes of the cockerel by meiosis, a reduction of chromosome number will take place so that each sperm will carry 19 pairs plus one sex or X chromosome. However, in the pullet there is an unpaired X chromosome. So, for every two ova formed, one will carry 19 pairs and the other will carry 19 pairs plus the X. Now if a sperm fuses with the first ovum, there would be 19 pairs plus an X from the sperm and 19 pairs from the ovum, which will give a female embryo containing 38 pairs plus an X. If on the other hand, a sperm fuses with the second ovum there would be 19 pairs plus an X from the sperm and 19 pairs plus an X from the ovum with a resultant male embryo having 38 pairs plus two X's.

The sex of the chicken is therefore determined by which ovum is present. As only two types of ova can be formed, 50 per cent. of the progeny will be pullets and 50 per cent. will be cockerels provided the different ova occur with the same frequency. Often in practice it is common in one lot of sexing to have many more pullets than cockerels or vice versa. However, if sex ratio figures were kept for many thousands of chickens it would be found to approach very closely to a 50–50 ratio.

If this sex ratio does not apply, it is usually found that there are more embryonic deaths in the group that is deficient in number, for example, if many more pullets are being hatched than cockerels then probably the cockerels are dying before they hatch. There is no truth in the statement that a cockerel will "throw" many more pullet chickens than cockerel chickens.

Of course the human element also comes into the picture. If more cockerels are sexed than pullets at hatching time it could be that the sexer is putting all the "doubtfuls" into the cockerel box so that customers won't complain that they got too many cockerels with their pullets. Often the person buying cockerels doesn't mind a few pullets for the price of cockerels.

The Importance of Sex.

How many people have stopped to consider why nature provided sex in animals? The most obvious reason of course is for the continuation or increase of the species. However, there is more to it than just this.

Meiosis (reduction division) is a complicated process, whereby the progeny will receive half of its chromosomes from the father and half from the mother. Thus the mating of two individuals allows new combinations of genes and hence more variation in their progeny. There is no doubt that many of these new combinations are worse than those of the parents. However, there are also many that result in more vigorous progeny or progeny better suited to their environment. This is, in fact, the basis of evolution. It is this variation in animals which has allowed man to select those best suited for his purposes and so produce the breeds of today. This is one of the basic principles of any breeding programme.

Linkage.

As many genes are carried on any one chromosome, then these genes must be inherited together. These are referred to as "linked" genes and all the genes on the one chromosome collectively are referred to as a "linkage" group. If there are 39 homologous pairs of chromosomes then there must be 39 linkage groups.

An important aspect of linkage is "sex linkage." This is associated with the difference in number of chromosomes between the male and female. We have seen that the female has only one X chromosome whereas the male has two.

One important aspect of this can be seen immediately with respect to dominance. Normally a recessive character will not show unless both recessives are present. However, in the female with only one X chromosome, recessives on this chromosome will be expressed even though only present singly because there are no dominant alleles to suppress them.

A simple example of this is the character "barring," which is a sex linked dominant. If we mate a barred female with genotype B– (the dash stands for the missing chromosome) and a non-barred male with genotype bb, we find that all the male progeny will be barred (Bb) and the female progeny non-barred (b–). See Plate 11. This is explained by the fact that the males inherit an X chromosome carrying the dominant B from their

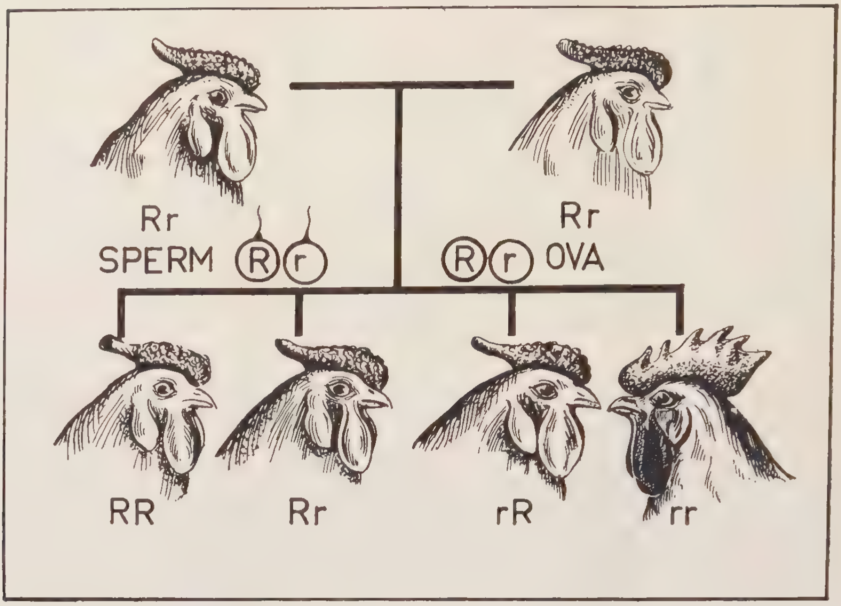


Plate 13.

A Cross Between Two Rose Comb Birds (Rr) (Plate 12) Will Produce Rose Comb and Single Comb Progeny in a Ratio of 3 : 1. Of these only one rose comb bird (RR) and the single comb bird (rr) will breed "true".

mothers and the recessive b on the X chromosome from their fathers.

As B is dominant to b, then all males will be barred. However, the females inherit no genes for this character from their mother and the recessive b on the X chromosome from their fathers. They will therefore be non-barred, as there is no dominant to suppress the recessive b.

The crossing over which occurs during meiosis (reduction division) has an important bearing on linkage. Linkage can be broken with respect to the genes that cross over. (See Plate 8). If we have three genes A B C on one chromosome and their alleles a b c on the other then a cross over of A and a will produce new combinations in the form of a B C and A b c. This new combination may have a different effect on characters in progeny which inherit either of these chromosomes. The different effect may be either better or worse than that of the original linked group (A B C or a b c). However, it produces more variation and hence more chance for selection of breeders.

Mutations.

Mutations are often referred to as "sports." They are actually brought about by a change in the structure of a gene. If we regard the gene as a D.N.A. molecule we could easily understand that a slight accident might alter the structure of this molecule. This altered gene would then have a different effect on its character than it did before mutation. Once altered, the gene reproduces itself at mitosis or meiosis in the altered state and if this gene goes to make up a new individual an altered character will result.

Mutations are more often detrimental to the individual but some lucky chances do occur and produce an individual with an improved character. This has been very important in evolution and also has produced a few good combinations for breeders.

Science has advanced sufficiently to be able to produce these mutations at will by the use of X-rays, radio-active bombardment of the reproductive cells, and certain chemicals. This is one of the reasons why radio activity is dangerous to humans.

The scientist, however, cannot predict what mutations will be produced and he merely hopes that some will result in better individuals. This has been realised in practice on many occasions. One good example can be quoted in the case of the fungus which is used for the production of penicillin. Many of these fungi were subjected to X-ray treatment in the hope that a new strain could be produced that would manufacture penicillin at a higher rate. After examining many of the mutant strains one was found that fulfilled this ambition, and was actually four times better than its forebears.

The Practical Application.

The problem now arises of applying the knowledge to animal breeding. This unfortunately is not so easy. The science of genetics is only 60 years old. In this time, advances have been rapid. However, many things are still uncertain. There are in fact many characters which can be explained in simple terms but unfortunately the economic characters such as "livability" and egg production are probably governed by hundreds of genes. This is one of the reasons why in our breeding schemes we test families of birds rather than individuals. The record for the whole family tells us more about the individuals in that family than would the records of any of the individuals by themselves.

Let us refer then to a simple case. In the cross previously mentioned between the rose comb bird and the single comb bird, you will recall that we referred to the rose comb bird as RR to indicate that on each member of a particular homologous pair of chromosomes there was a dominant gene R for rose comb. On the other hand the single comb bird was referred to as rr as it carried both the recessives for rose comb. It doesn't matter which way we cross these birds, but for purposes of illustration, we will use a single comb male and a rose comb female. When the sperm and ova are formed in these birds by meiosis (reduction division) the sperm will carry one of the genes (r) for single comb and the ovum will carry one of the genes (R) for rose comb. The resultant progeny will therefore be Rr which will be rose comb because the R is dominant to r. See Plate 12.

That is very simple. Now what happens when we cross two of the progeny together. As both the male and female will have the genotype of Rr then sperm and ova could be formed carrying either R or r. We must assume that any sperm can fuse with any ovum. See Plate 13.

We find there are three different types because Rr and rR can be regarded as the same. If we look at these birds (their phenotype) we find three have rose combs and one has a single comb. This is what we would have expected. The rr bird is single comb because it carries both of the recessives. In Rr and rR the R is dominant to r so the bird has a rose comb. However, there is an important point—only RR and rr birds will breed true. The Rr and rR will, if crossed together, again give the 3:1 ratio of rose to single comb.

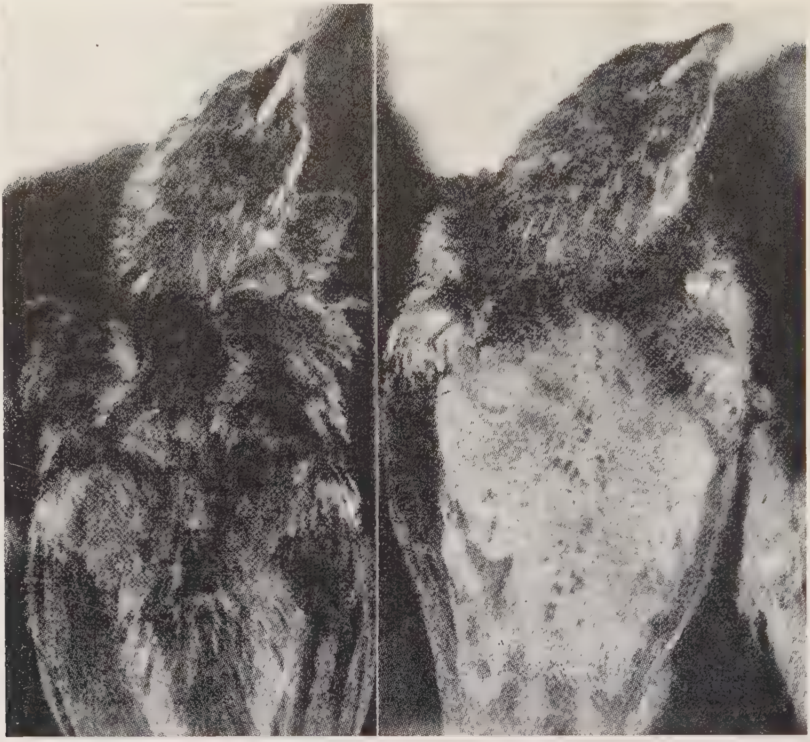


Plate 14.

The difference in the Rate of Feathering is Obvious in These Two Chickens, Both 5 Weeks of Age. The bird on the right (KK) is slow feathering and the one on the left (Kk) is intermediate between slow and fast feathering (kk).

Incomplete Dominance.

We have stated that with a pair of allelic characters one is sometimes dominant to the other (the recessive). On the other hand we may have incomplete dominance. In this case there is an additive effect, so that in the heterozygote with one dominant and one recessive gene the expression of the character will be intermediate between that produced by both dominants or both recessives. An example of this is the rate of feathering in fowls.

On the X chromosome is located a gene K which is dominant for slow feathering, its recessive k producing a fast rate of feathering. We could then say that males with a genotype of KK would be slow feathering, males with kk would be fast feathering and males with Kk would be intermediate. See Plate 14. As this gene is on the X chromosome and females only carry one X chromosome then they can only be K or k. In the case of genotype K they will be intermediate, with regard to feathering because only one "dose" of K is present. With a genotype of k they would be fast feathering.

Where Do We Go From Here?

Many books have been written on genetics. It is a study that is becoming increasingly popular. As we said previously, animal breeding will be one of the sciences used to increase the efficiency of production.

From an article as brief as this we could not hope to learn a great deal about animal breeding. Such an elementary study would, however, enable the reader to make a start. Without such a start it would be even more difficult to understand the books and papers written on the subject.

What We Should Remember.

We should keep in mind that genes and chromosomes are actual structures contained in the body cells. These cells divide by mitosis to produce more cells and by meiosis to reduce the chromosome number to half (the haploid number) in the sperm and ova. When the sperm and ovum fuse, the chromosome number is restored to the diploid number in the progeny. For this reason the progeny inherit half of their genes from each of their parents. Remember that the character is not actually inherited as such but the animal inherits the ability to express the character. Environment plays a big part in the ultimate expression of many characters in the progeny. Sexual reproduction is important because it produces new combinations of genes and gives the breeder scope for selection. In the future, induced mutations by X-rays and so on, may give us new useful combinations that we never dreamed of. So referring again to the Queensland Poultry Improvement Plan, there is every reason to believe that it will give us more efficient fowls than we have to-day.

A Little Water Can Go a Long Way

Irrigation studies by the Agriculture Department show that even limited supplies of irrigation water have a big place in fodder production. Used to supplement moisture stored in fallows and the normally irregular rains, these supplies can carry crops through to maturity.

A statement by the Minister for Agriculture and Stock (Hon. O. O. Madsen, M.L.A.), reveals that the ideal in growing dairy fodder is to irrigate perennial crops or pastures continuously. But the use of supplementary irrigation on annual crops is an economic alternative.

In almost every dry spell, there is the picture of watercourses and dams drying up, with the need to restrict irrigation. Ways of using restricted water supplies economically are being investigated by the Department and already a clear pattern is emerging.

A recent report by the Department's Irrigationist (Mr. A. Nagle) points out that grain sorghum needs 300 lb. of water to produce 1 lb. of dry matter. Sudan grass, maize, wheat, cowpeas and oats use more moisture, in that order, than does grain sorghum. But all these annuals need much less than the 800 to 1,000 lb. of water that lucerne and pasture use to produce 1 lb. of dry matter.

In trials at the Gatton Regional Experiment Station, the merits of giving fodder crops small supplementary irrigations have been examined. Results of some trials have shown that this watering has meant the difference between good yields and complete failure.

There is, for example, the case of a wheat and field pea planting. Here, the mixture was planted in a well-prepared, moist seedbed early in July. A 2 in. irrigation was applied in mid-August. There was no rain until a week before harvesting and this, of course, was too late to affect the yield. Ten weeks after planting, the crop cut 15½ tons of green forage an acre—an average production rate of 1½ tons per acre per week.

A summer crop of white panicum and Poona cowpeas also gave outstanding results. Planted in December on fallowed land, the crop was given a 1¾ in. irrigation early in January. Good rains were recorded prior to harvest on February 24, but they had little influence on the yield. The final yield was 22 tons of green material an acre—an average production rate of 2.2 tons per acre per week.

Mr. Madsen said comparable results were obtained in more than 10 other trials. This clearly indicates that crops planted on good fallows need only a small amount of irrigation to yield heavily.

Many parts of Queensland are poorly endowed with irrigation water, but these studies show what could be done in those areas with limited water. This work is a pointer to the growing importance of the small farm dam in growing fodder.

Keep Your Cattle Off Poison Peach

By O. H. BROOKS,
Divisional Veterinary Officer.

Feeding tests have shown that 5 lb. of poison peach leaf will cause death in cattle.

Wherever softwood scrub in coastal areas has been cleared there has usually been a problem with poison peach suckers. This plant remains a hazard to stock in scrub pastures especially during dry periods, when the leaves are attractive. In this respect it is very similar to lantana which remains harmless until hungry cattle are attracted to eat toxic quantities.

Peach leaf poison bush (*Trema aspera*) or poison peach, is commonly a shrub about 6 ft. high but may develop into a small tree up to 14 ft. The leaves, narrower and more elongated than those of lantana, are arranged alternately in two ranks on either side of the light brown twigs. They are rough on the upper surface, serrated along the edges, and usually emerald green in colour. The ripe fruits, which are nearly as big as a pea, are eaten readily by birds.

It occurs mainly along the fringes of rain forest, along gullies through forest country and as a second growth in cleared scrub. It has been seen occasionally growing along roadsides in open forest country where the soil has been banked and there is a good water run off.

As poison peach has been a problem since early settlement, it is not surprising that conceptions of the effect of the plant on cattle vary considerably.

Perhaps the most common opinion held is that poison peach causes "dry bible" which is impaction of the third stomach of ruminants. This conception in all probability arises from the association of cattle eating poison peach under drought conditions which cause dry bible. It is nevertheless possible that the toxic principle of poison peach may cause a form of paralysis of the third stomach (bible or omasum).

Painful Death.

During recent years the most serious losses have occurred amongst cattle which have shown acute and painful symptoms.

Some samples of peach have shown appreciable quantities of HCN (prussic acid) but it is generally agreed that deaths from this plant are not from HCN. The poisonous principle is unknown. Feeding tests have shown that 5 lb. of leaf will cause death in cattle.

Poison peach causes animals to become depressed, with obvious abdominal pain. The head is held low and the muzzle may reach the ground. Animals have been known to charge when the pain is severe.

Scouring is a feature. The dung becomes very dark due to bowel haemorrhages.

When the carcass is examined after death, the most obvious changes are haemorrhages under serous membranes covering the lungs and abdominal organs. These are usually striking. The fourth stomach and the first part of the intestines are inflamed. The intestine may be filled with blood. Large haemorrhages occur on the outside of the heart and in the lining of its cavities. These symptoms apply to animals which die within a few days of eating poison peach.

During drought, animals which browse on the plant for long periods may show dry bible without the severe irritation of the bowel appearing in the acute cases.

The danger of the plant appears to vary according to locality and predisposing factors rather than any particular stage of growth or season.

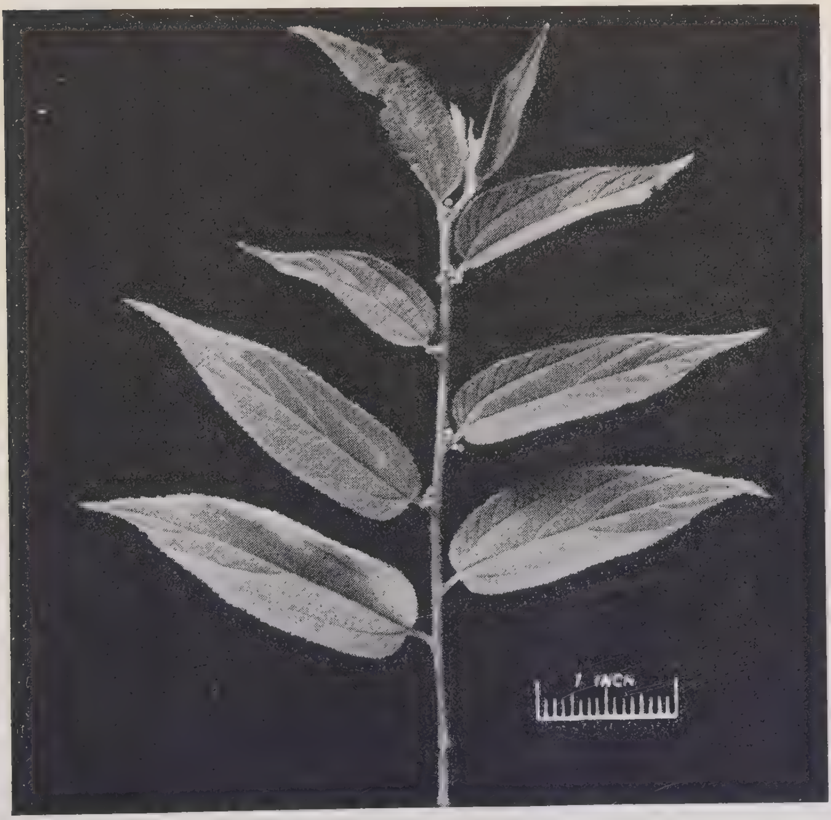


Plate 1.

Poison Peach, Showing Leaves and Berries.

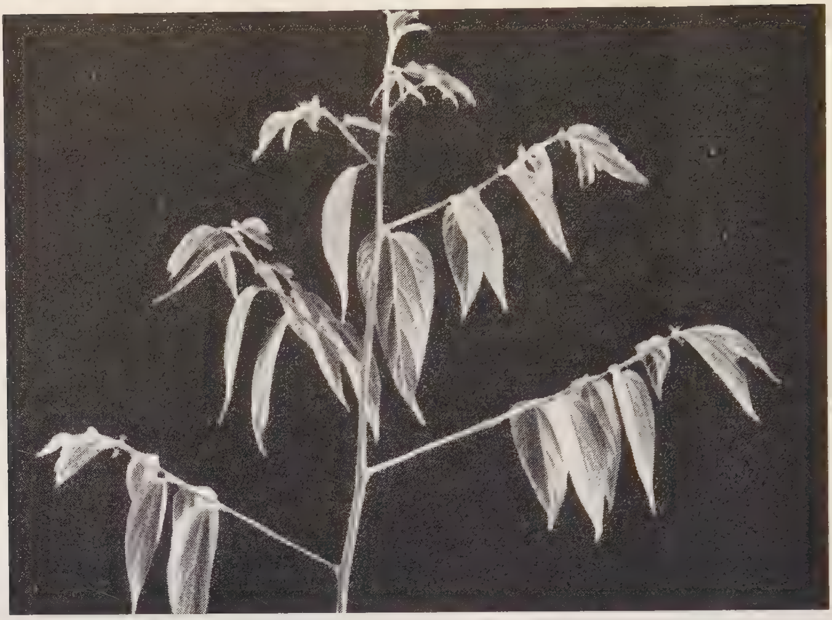


Plate 2.

Poison Peach Occurs Mainly Along the Fringes of Rain Forest, Along Gullies Through Forest Country, and as a Second Growth in Cleared Scrub.

A popular belief is that the plant is more toxic when flowering or carrying berries but there is no evidence to support this observation.

Poisoning from regrowth and seedlings of poison peach may be seen following the clearing of scrub areas or when cattle are allowed access to a newly established pasture after a burn.

Unfortunately there is no known cure for poisoning by peach leaf poison bush. Some cases may be saved by drenching with astringents mixed with flour gruel. Paraffin oil may also soothe the inflamed bowel wall but in most cases symptoms have developed too far and it is usual to find animals dead.

* * *

Dairyman, Do It Now!

EXTEND grazing season, by mowing early. Change separator oil and renew vacuum pump oil wicks. Drench for worms to control heavy summer infestations. Quality counts, so follow Departmental recommendations for dairy hygiene.

Treating Scours In Young Pigs

By S. G. KNOTT,
Divisional Veterinary Officer.

The background to the development of scours in young pigs, and advice on prevention of the trouble, was given in an article in the January issue. The following article deals with treatment.

WHILE there is a tendency for some farmers to place more importance on treatment than on prevention, it would be to their advantage to reverse this attitude and to pay the greatest attention to the preventive measures outlined in last month's issue.

Diarrhoea in piglets can start soon after birth, but most commonly at 2-3 weeks of age. The droppings become fluid or semifluid, whitish or yellowish-white in colour, and are passed frequently. Often the young pigs strain while passing this. Eating is suppressed and they lose condition, the hair tends to stand on end and they often huddle in corners.

While scours in baby pigs in many cases results from a combination of several factors, the chief causes and their treatment will be discussed separately for clarity.

Piglet Anaemia

Although sow's milk is a near-complete food for piglets, it is deficient in iron. The result is that piglet anaemia is commonest in intensive piggeries or where the piglets do not have access to clean soil at an early age.

The condition generally appears between 1 and 4 weeks. When it is realised that piglets suckling on a good sow can reach 5 times their birthweight in 3 weeks, it is easy to appreciate why the condition is precipitated.

The piglets cease to be as active as previously and they lose their bloom; their membranes become paler and a scour develops. Breathing may become rapid.

Where piglet anaemia occurs occasionally or regularly, the following recommendations will ensure that the piglets should thrive right through until weaning time. They can also be used for remedial measures in cases of emergency:

(*a*) At 3-5 days, dose each piglet by mouth with 1 c.c. of a saturated solution of *ferri et ammon cit.* Your local chemist can easily prepare it for you. The easiest method of administration is to hold the piglet upright and give it through some valve rubber tubing on the nozzle of a graduated hyperdermic syringe.

(*b*) A 2 c.c. injection of an iron and dextran compound under the skin is very efficient. Manufactured by drug firms, this is used extensively overseas and will probably come into favour here soon.

(*c*) Scatter a handful of ferrous sulphate over the floor.

(*d*) Allow access to clean parasite-free pasture or supply a shovelful of fresh clean dirt in the pen daily.

Infectious Scours

The commonest cause of infectious scours is a bacteria known as *Escherichia coli.* This bacteria is a normal inhabitant of the gut, but under certain circumstances, for example, chilling, filthy udder and so on, it becomes virulent and overwhelms the resistance of the animal.

Other bacteria such as *salmonella* may be a cause of scours, while viruses have also been incriminated.

Treatment is as follows:

(*a*) Dose each piglet with 1-2 teaspoonsful of castor oil according to size.

(*b*) Treat immediately with a sulpha drug, preferably phthalyl sulphathiazole at the rate of 1 tablet per 10-12 lb. liveweight for 3 days.

Antibiotics such as Terramycin, aureomycin or chloromycetin are also effective provided they are used at a therapeutic and not at growth-stimulant level.

It should be added that very occasionally a scour will appear that is not influenced greatly by these drugs.

(*c*) Clean the sow's udder, remove any dirty litter and provide plenty of warm bedding and clean shelter.

(*d*) A subcutaneous injection of ½-1 c.c. of a vitamin B_{12} preparation helps scouring piglets to quickly become thrifty again and recover their appetite and bloom.

Secondary Manifestation

With scours, always be on the lookout for some other primary cause which may be in its early stages. For instance, piglets may start to scour if pneumonia is developing and is not evident. Also scours may precede and accompany pig pox in a litter.

Nutritional Scours

Nutritional scours have been dealt with extensively in the previous article last month. Remember that faulty feeding of the sow can affect the litter. Piglets may scour slightly and temporarily when they first attempt solid feed. The feeding of orphan piglets needs careful attention.

Watch These Points

If you have trouble with piglet scours, pay attention to the following points:

1. Wash the sow and arrange for her to farrow in clean surroundings with plenty of warm bedding available to avoid chilling.

2. Avoid piglet anaemia by supplying the litter with iron at 3-5 days of age.

3. Treat early with castor oil and phthalyl sulphathiazole (1 tablet per 10 lb.) or an antibiotic at the correct dose rate.

Injections of vitamin B_{12} aid in quick recovery.

4. Correct any nutritional faults.

* * *

Timely Tip

Order seed and fertilizer for autumn plantings.

Farm Wisdom

IT'S not too early to get ready for your lucerne planting next April or May. You lay the foundation for a good stand during the next six months.

Your first care is to select the right paddock and here the kind of soil you have will be the deciding factor. Lucerne needs a deep, well-drained soil. It's very sensitive to waterlogging and will die out on a badly-drained soil.

Whether the land is old or new cultivation, it should be pre-cropped before it's put under lucerne. If possible, the cover crop should not be grazed, but should be turned under for green manure a month or six weeks before working up the lucerne seedbed. For pre-cropping, cowpeas should be sown at 15 to 20 lb. per acre and treated with inoculum obtainable free from the Department.

—*V. J. WAGNER,*
Chief Agronomist.

THE potato tuber moth is the most destructive of the potato pests and may be more troublesome in the spring crop than in the autumn crop. Potato plants should be sprayed with DDT commencing soon after moths or leaf miners are noticed. Two sprayings, and possibly a third, spaced two to three weeks apart, will prevent damage to the tops and will reduce the likelihood of a large infestation developing before harvest. The DDT should be used at 1lb. per acre at each application.

As the crop approaches maturity, it should be hilled as an added precaution. But don't hill too early, as this can interfere with tuber formation. Dusting the crop with a 2 per cent. DDT dust during harvesting is needed to protect the bagged crop. A brown pigmented DDT dust may be used for tubers intended for table use.

—*W. A. SMITH,*
Entomologist.

SUMMER grazing crops deserve a place on every Queensland dairy farm. These crops are a standby to cushion the effects of hot, dry spells between storms. And if there's a surplus, it can be stored as hay or silage.

There's still time to prepare your land and plant these crops. White panicum and Japanese millet are the most popular crops in coastal districts, though giant and dwarf setaria are sometimes grown. In the drier, inland districts, Sudan grass is the most popular crop, but French millet is used occasionally.

Always include a legume in the planting to improve the fertility of the soil and provide a better balanced ration for stock. Cowpeas and velvet beans are the best summer legumes, and the recommended varieties are Cristaudo cowpeas and Mauritius velvet beans. Don't forget to treat the legume seed with inoculum which is available free of charge from the Agriculture Department.

—*O. L. HASSELL,*
Senior Adviser in Agriculture.

Brucellosis-Tested Swine Herds (As at 16th January, 1959.)

Berkshire.

S. Cochrane, "Stanroy" Stud, Felton
J. L. Handley, "Meadow Vale" Stud, Lockyer
O'Brien and Hickey, "Kildurham" Stud, Jandowae East
G. C. Traves, "Wynwood" Stud, Oakey
Westbrook Farm Home for Boys, Westbrook
H.M. State Farm, "Palen" Stud, Palen Creek
A. R. Ludwig and Sons, "Beau View" Stud, Beaudesert
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
R. H. Crawley, "Rockthorpe" Stud, *via* Pittsworth
F. R. J. Cook, Middle Creek, Pomona
Mrs. I. M. James, "Kenmore" Stud, Cambooya
H. L. Stark, "Florida," Kalbar
H.M. State Farm, Numinbah
G. L. Gabanko and R. H. Atkins, "Diamond Valley" Stud, Mooloolah
L. Puschmann, "Tayfeld" Stud, Taylor
C. E. Edwards, "Spring Valley" Stud, Kingaroy
V. F. Weier, "La Crescent," Clifton
N. Rosenberger, "Nevrose," Wyreema
L. P. Orange, "Hillview," Flagstone Creek
B. Osborne and Dr. J. W. Best, Miltown Stud Piggery, Warwick
W. Young, Kybong, via Gympie
E. J. Clarke, Mt. Alford, *via* Boonah
G. McLennan, "Murcott" Stud, Willowvale
C. F. W. and B. A. Shellback, "Redvilla" Stud, Kingaroy
J. C. Lees, "Bridge View" Stud, Yandina
F. Thomas, "Rosevale" Stud, M.S. 373, Beaudesert
A. C. Fletcher, "Myola" Stud, Jimbour
Q.A.H.S. and College, Lawes
E. F. Smythe, "Grandmere" Stud, Manyung, Murgon
E. R. Kimber, Block 11, Mundubbera
A. J. Potter, "Woodlands," Inglewood
Regional Experiment Station, Hermitage
J. W. Bukowski, "Secreto" Stud, Oxley
R. Astbury, "Rangvilla," Pechey
L. Pick, Mulgildie
D. G. Grayson, Killarney
A. French, "Wilson Park," Pittsworth
P. L. Pfrunder, Pozieres

Large White.

H. J. Franke and Sons, "Delvue" Stud, Cawdor
Garrawin Stud Farm Pty. Ltd., 657 Sandgate road, Clayfield
J. A. Heading, "Highfields," Murgon
R. Postle, "Yarralla" Stud, Pittsworth
B. J. Jensen, "Bremerside" Stud, Rosevale, *via* Rosewood.
E. J. Bell, "Dorne" Stud, Chinchilla
L. C. Lobegeiger, "Bremer Valley" Stud, Moorang, *via* Rosewood.
H. R. Gibson, "Thistleton" Stud, Maleny
H.M. State Farm, Numinbah
V. P. McGoldrick, "Fairymeadow" Stud, Cooroy
S. T. Fowler, "Kenstan" Stud, Pittsworth
W. Zahnow, Rosevale, *via* Rosewood
Regional Experiment Station, Biloela
G. J. Hutton, "Grajea" Stud, Cabarlah
H. L. Larsen, "Oakway," Kingaroy
A. Palmer, "Remlap," Greenmount
G. I. Skyring, "Bellwood" Stud, *via* Pomona
G. Pampling, Watch Box road, Goomeri
M. Hall, "Milena" Stud, D'Aguilar
K. B. Jones, "Cefn" Stud, Pilton road, Clifton
Barron Bros., "Chiltern Hill," Cooyar
K. F. Stumer, French's Creek, Boonah
Q.A.H.S. and College, Lawes
R. S. Powell, "Kybong" Stud, Kybong, *via* Gympie
C. Wharton, "Central Burnett" Stud, Gayndah
S. Jensen, Rosevale, *via* Rosewood
V. V. Radel, Coalstoun Lakes
H. R. Stanton, Tansey, *via* Goomeri
L. Stewart, Mulgowie, *via* Laidley
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
O. J. Horton, "Manneum Brae" Stud, Manneum, Kingaroy
Dr. B. J. Butcher and A. J. Parnwell, 684 Logan road, Greenslopes, Brisbane
R. Kennard, Collar Stud, Warwick
A. C. H. Gibbons, Mt. Glorious
A. Kanowski, "Exton," Pechey
L. C. and E. Wieland, Lower Cressbrook
P. L. and M. T. D. Hansen, "Regal" Stud, Oaklands, Rangeville, Toowoomba.
J. C. Lees, "Bridge View" Stud, Yandina
R. Rhodie, Clifton
C. Assenbruck, Mundubbera
A. J. Mack, Mundubbera
J. & S. Kahler, East Nanango
C. P. Duncan, "Hillview," Flagstone Creek

Tamworth.

D. F. L. Skerman, "Waverley" Stud, Kaimkillenbun
A. C. Fletcher, "Myola" Stud, Jimbour
Salvation Army Home for Boys, "Canaan" Stud, Riverview
Department of Agriculture and Stock, Regional Experiment Station, Kairi
F. N. Hales, Kerry road, Beaudesert
T. A. Stephen, "Withcott," Helidon
W. F. Kajewski, "Glenroy" Stud, Glencoe
A. Herbst, "Hillbanside" Stud, Bahr Scrub, *via* Beenleigh
F. Thomas, "Rosevale" Stud, M. S. 373, Beaudesert
H. J. Armstrong, "Alhambra," Crownthorpe, Murgon
R. H. Coller, Tallegalla, *via* Rosewood
D. V. and P. V. Campbell, "Lawn Hill," Lamington
S. Kanowski, "Miecho" Stud, Pinelands
N. R. Potter, "Actonvale" Stud, Wellcamp
L. C. and E. Wieland, Lower Cressbrook
J. D. Booth, Swan Ck., Warwick

Wessex Saddleback.

W. S. Douglas, "Greylight" Stud, Goombungee
C. R. Smith, "Belton Park" Stud, Nara
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
J. B. Dunlop, "Kurrawyn" Stud, Acacia road, Kuraby
M. Nielsen, "Cressbrook" Stud, Goomburra
G. J. Cooper, "Cedar Glen" Stud, Yarraman
"Wattledale" Stud, 492 Beenleigh road, Sunnybank
Kruger and Sons, "Greyhurst," Goombungee
A. Scott, "Wanstead" Stud, Grantham
G. C. Burnett, "Rathburnie," Linville
A. J. Mack, Mundubbera
J. Ashwell, "Greenhill," Felton South

Large Black.

E. Pointon, Goomburra

Plate 1: **Machine Harvester tipping Basket of Cotton for Baling.** A. W. Brownlie's irrigated property at Theodore.

Cash In On Irrigated Cotton

By I. J. L. WOOD,
Adviser in Agriculture.

Using irrigation, farmers of the Dawson and Callide Valleys in central Queensland, have lifted their yields of seed cotton up to 1,900 lb. an acre. At a minimum guaranteed price of 14d. a lb. for all cotton, except the lowest grades, these yields would mean a gross return of more than £100 an acre, and a net return of more than £55.

By using irrigation, yields can be more than doubled and what is more important, net returns per acre can also be more than doubled. With irrigation, there is no need to wait for planting rains. You can get your crop established at the most ideal time for a successful yield. Cotton which is planted early and develops unchecked by moisture stresses, sets a heavy early crop and usually is untroubled by major cotton pests. Harvesting can be completed early, followed by early ploughing, allowing the area to have a reasonable fallow period before next season's planting.

Plate 2.

Land-Levelling for Furrow Irrigation of Cotton. Mr. L. Drew's property at Gibbergunyah.

In districts such as the Dawson and Callide Valleys, where abundant water is available in weirs, creeks and from underground sources, there is a great potential for the expansion of cotton growing under irrigation.

Mr. A. W. Brownlie, of Theodore Irrigation Settlement, an experienced grower, irrigated 108 acres of cotton (Miller 43-9-0) during the 1957/58 season, which yielded 164,000 lb. of high grade seed cotton. Several areas included in the 108 acres yielded over 2,000 lb. of seed cotton per acre. This cotton should average at least 14½d. a lb., giving a gross return of about £10,000.

His costs totalled about £4,500, made up of:—

	£
Harvesting (hand)	3,300
Insecticide	100
Land preparation, seed, planting, cultivation, fuel, water, irrigation, spraying, rates, bales, etc.	1,080
	£4,480

This leaves a net return of about £5,500, which is over £50 an acre, and a net return of over £100 a week.

Light Equipment

Cotton, very fortunately, is one of those crops that requires only a simple set of implements to produce. Harvesting is done either by hand or by mechanical harvesters.

Mr. Brownlie's equipment consists of—

- 1 light 3 pt. linkage tractor.
- 1 2-furrow plough.
- 1 offset disc harrow with scalloped front discs.
- 1 spring tine cultivator to which is attached two single row planting boxes with trailing rubber tyre press-wheels.
- 1 set peg-tooth harrows.
- 1 wooden smoother (for levelling after cultivation).
- 1 6-row spray outfit.

With this equipment he is able to handle his cultivation area satisfactorily.

As can be seen, cotton growers are not overloaded with equipment of high capital cost except where a mechanical picker is purchased. This may be economically sound, too, where large areas are planted and high yields are obtained and hence depreciation costs would be comparatively very low.

Mr. Brownlie considers that the best results are gained with:

(1) Early planting (October);

(2) Early cultivation for weed control;

(3) Irrigating before moisture stresses occur in the plants.

Mr. L. Drew, of the new Gibbergunyah Irrigation Settlement near Theodore, had never seen cotton grown before this season. He planted 20 acres of the Empire variety on a newly cleared area of light alluvial soil which had been levelled for irrigation just before planting.

He harvested 39,500 lb. of high grade seed cotton, valued about £2,300.

Costs of production were:

	£
Harvesting (hand)	800
Other costs at about £8 per acre	160
Total	£960

No insecticidal control was necessary on this crop. Only part costs of initial levelling were included.

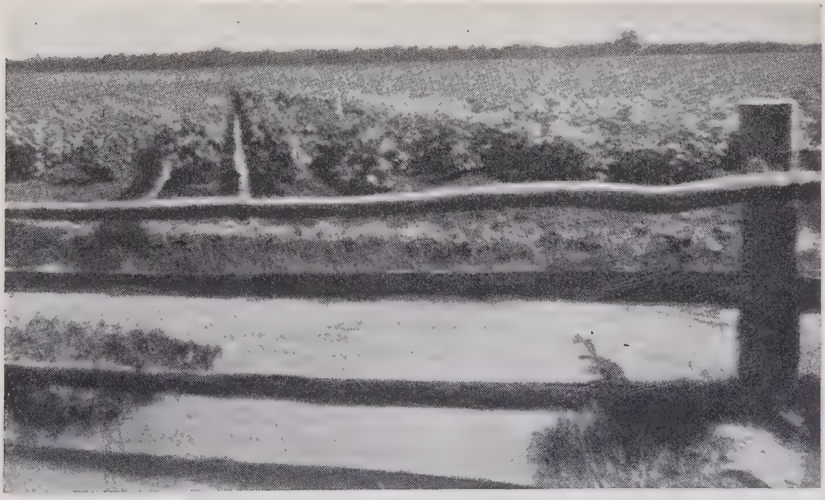


Plate 3.

Furrow Irrigation of Cotton on the Moura (Dawson Valley) Farm of Messrs. Fairweather Bros.

Plate 4.

Early Cultivation Means Clean Crops.

This leaves a net return of £1,440 from 20 acres, or £72 per acre.

Suitable Pioneer Crop

Cotton's ability to produce a worthwhile crop on newly cleared ground is well illustrated on this irrigated farm which was settled by Mr. Drew only in July, 1957. Full marks go to Mr. Drew and several of his neighbours who all grew very successful crops, maintaining a high standard of cultural practice right throughout the crop's growth.

Mr. Drew considers there is no better cash crop than cotton under his conditions.

At Thangool, in the Callide Valley, Mr. G. Burrows irrigated 50 acres of cotton, Empire variety, from Kariboe Creek. He harvested 62,000 lb. of high grade seed cotton. Only 33 acres were watered to near full requirements, the remaining 17 acres receiving only a watering before planting. Nevertheless the average for the 50 acres was 1,240 lb. of seed cotton an acre, worth £75 gross an acre.

This area was furrow-irrigated, but no preliminary grading was carried out and watering was rather irregular due to the uneven fall of the ground. It is essential that land for furrow irrigation of cotton be graded to a uniform fall. Efficient irrigation and economy of water usage are dependent on good land preparation.

Dryland Comparison

An area of Miller 43–9–0 cotton grown in a nearby paddock on comparable soil and under similar conditions, except that it was not irrigated, yielded only 600 lb. per acre which is less than half the yield off the irrigated area.

At Moura Irrigation Settlement on the Dawson River, Messrs. Fairweather Bros. had the following yields in the last two seasons from irrigated and dryland areas on similar soil types and conditions:

		An acre.
1957—		
Irrigated ..	100 acres yielded	860 lb.
Dryland ..	60 acres yielded	425 lb.
1958—		
Irrigated ..	110 acres yielded	798 lb.
Dryland ..	110 acres yielded	295 lb.

The increase in yields as the result of irrigation is well illustrated in these figures. The Fairweather brothers consider that they could raise their yields still further on the irrigated areas by more frequent watering during growth.

How You Can Do It

Summing up the results of these growers of irrigated cotton in Central Queensland, the following practices appear to be essential in the production of high-yielding crops of high grade seed cotton:

(1) *Early and thorough land preparation* preferably commencing in June for old cultivation land and much earlier for new ground. The bulk of the irrigated cotton crop is watered by the furrow method. Where furrow irrigation is used, levelling should be completed as soon as possible to allow shifted soils to settle. It needs to be done as accurately as possible. The length of furrows should be governed by the grade and the type of soil. In general, furrows with runs of more than 10 chains should be avoided, the area being subdivided by another supply ditch.

(2) *Early planting,* preferably in mid October. The seed-bed requires to be fairly fine and free from old stalks, sticks and stones, particularly if the area is to be machine-picked.

Plate 5.

Straight Rows Make Cultivation and Machine Picking Easier.

Plate 6.

Gappy Stands Increase Weeds, Decrease Yields.

Planting needs to be done as accurately as is physically possible. Rows require to be parallel, with an even dropping of seed in order that a regular stand results which can be cultivated, irrigated and harvested efficiently. This planting can only be done with a perfectly functioning planter with accurate row markers. The aim should be to plant so that cultivation tines can come within 2 in. on either side of the plants.

If planting rains do not fall it is preferable to irrigate and then plant, rather than plant and then irrigate.

(3) *Seeding rate* of 15 lb. an acre will ensure a good stand under most conditions. For machine harvesting, close spacing is an advantage. The use of a press wheel type of planter is recommended.

If for some reason such as a heavy storm after planting or a cut worm attack, a patchy germination occurs, immediately rip it out and replant. A gappy stand not only means fewer plants an acre and thus less cotton, but allows grasses and weeds to grow which will eventually lower the grades of cotton harvested.

(4) *Early cultivation* to eliminate weeds both in and between the rows. This usually takes the form of cross-cultivation with light spike harrows or fine fingered weeders—the latter doing by far the better job. This cultivation is done on a hot day when the cotton plants are supple and do not break off or pull out easily and the disturbed weeds die quickly. On clean lands, cross weeding is unnecessary, only inter-row cultivation being required. Cultivations then only follow irrigations or rain and are all inter-row. High clearance tractors with mid-mounted cultivators do the most accurate cultivating.

(5) *Early irrigation* to avoid moisture stresses and checks in the growth of the plant. In ground that has subsoil moisture down 2-3 ft. at planting, irrigation should not be necessary until the plants are squaring freely, which should be 6 weeks after planting. The plants at this stage should have a well-developed, deep root system, which could be prevented by earlier watering. Attention to watering from here onwards largely governs the ultimate yield of the plants.

The plants will rapidly develop heavy loads of squares, flowers and bolls. Some shedding occurs normally, but every endeavour should be made to enable the plants to hold most of their load. So watering to prevent any moisture check from now on is very important.

The efficient irrigator will measure soil moisture by using a soil auger frequently to anticipate moisture checks. The cotton plant itself has its own means of indicating approaching moisture shortage by accelerated flowering and colour changes along its growing stems. Cotton should be irrigated when flowering and/or a reddish stem colour approach within 9 in. of the top of the plant. But always the amount of available soil moisture should be checked with the soil auger.

This practice of anticipating moisture stresses is doubly important where large areas have to be irrigated as there is a considerable time lapse between commencement of watering and completion. It is also very important when heat-wave conditions are being experienced, as fruit-shedding then occurs even after a slight moisture stress. Furrowing out for irrigation is normally done immediately before watering and the furrows are filled in during the cultivation after watering. Furrows should be wide and shallow rather than narrow and deep.

Plate 7.

Mid-Mounted Cultivator Equipment Gives Clear View.

Early Insect Control

If insecticidal spraying is necessary, carry it out promptly and efficiently with equipment that can cover large acreages quickly.

Early Harvesting

Harvesting should be commenced and completed as soon as possible. A cotton crop produced without any checks to growth will open uniformly and thus the bulk of the crop can be harvested earlier than crops that have been subject to checks in growth. Early harvested cotton weighs well and grades well. Early harvesting allows for early land preparation for next season.

Early Crop Rotation

In irrigated areas it is customary to grow cotton on the same ground for several years without change due mainly to the limited areas that can be irrigated. This practice seems satisfactory to date but some rotation would be advisable after a few years' cotton, especially on the lighter soils.

Owing to the limited areas that can be commanded by an irrigation plant, other crops in the rotation must have a high return to the acre. A cotton, lucerne, cereal, cotton rotation would probably suit the irrigator who is essentially a cash cropper.

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It's Wise To Grow Papaws From Local Strains

By J. B. DAVEY,
Experimentalist.

Queensland's papaw industry is based largely on district strains or types which have been developed from material of mixed origins. True or fixed varieties, such as those used in most other horticultural crops, are almost non-existent. Despite this, the industry is worth about £250,000 annually and some 430,000 cases of fruit are harvested from approximately 1,060 acres under crop.

Climate and soil have a profound influence on the performance and behaviour of papaws.

Essentially, the papaw is a tropical plant which thrives best in areas with a more or less equable climate characterised by high temperatures and rainfall. In Queensland, the crop is to be found growing along the coast in frost-free localities which permit more or less continuous plant growth throughout the year.

However, sizeable commercial production is limited to only a few areas, mainly on account of the rather precise soil requirements of the crop. A free-draining soil is essential; the papaw will not tolerate impervious soils which sooner or later in the life of the crop, become waterlogged. Deep sands and sandy loams are therefore the preferred soil types for the papaw, although the red-brown clay loams are used to some extent.

The chief centres of commercial production are Sunnybank, Rochedale and Brookfield in the metropolitan area, Mary Valley and Gunalda on the north coast, and Yarwun in central Queensland.

Acclimatisation.

It cannot be assumed that a variety or strain which performs well in one district will necessarily produce comparable crops of good quality fruit in other districts.

Pure lines such as the Bettina and Petersen strains, which were bred, and performed satisfactorily, on the north coast, proved rather disappointing when grown elsewhere. Locally developed strains such as those grown successfully at Yarwun, Sunnybank and Brookfield have likewise given unsatisfactory performances outside their own district. Similarly, material introduced from overseas has generally not lived up to its reputation when tested in Queensland.

Prominent among these introduced types were Hawaiian Solo—the leading variety in Hawaii, and Guagua, Cabacinha and Creme Caiena from South America. Their performance too

Plate 1.

Papaw Plantation. Trees in background are 15 months old; those in foreground are two months old.

has varied from one district to another as is the case with locally-produced types.

Hortus Gold, an importation from South Africa, proved the one exception. It has given reasonably good yields in most areas where it has been tried but fruit quality, particularly as regards flavour, has been somewhat variable. To its credit is its highly attractive skin colour, especially in the cooler months of the year when most tree-ripened papaws develop little colour.

Although climatic conditions have a tremendous influence on growth and ultimate yield, they also have a marked effect on fruit quality. Several factors are involved here, including external colour of the skin, internal colour of the flesh, flavour and firmness at maturity, and freedom from skin blemishes, particularly ripe fruit rots. Any one or more of these factors in fruit quality may be affected adversely when a variety or type is grown under a different set of environmental conditions.

It may be that winter temperatures are too low for satisfactory fruit development and ripening, that persistent cold winds cause skin blemishes, such as sun scald by reducing the leaf cover, or that the combined effects of high rainfall, temperature and humidity produce fruit lacking colour, firmness or good carrying capacity.

Hawaiian Solo is a typical example of a variety's inability to adapt itself to a change in climatic environments. In Hawaii, the climate is insular with more or less equable temperatures and an evenly distributed rainfall throughout the year. Under these conditions, Hawaiian Solo produces high quality fruit of excellent flavour and carrying ability during the whole cropping season. In southern Queensland, however, it produces quality fruit only during April and May; quality deteriorates sharply in the following months and is very much inferior to that of the best local types.

Utility Varieties.

Most of the locally developed strains of papaw serve two purposes at the moment; they supply the requirements of the fresh fruit trade and, to a lesser extent, the factory. Large papaws free from corrugations and skin blemishes are best suited to factory requirements. At present, a premium is paid by processors for fruit in excess of 3 lb.

Experience with other horticultural crops such as the pineapple, has shown that a cannery outlet for part of the produce improves the stability of an industry.

In view of the processor's need, it might therefore be desirable for plant breeders to develop large-fruited papaw types suitable primarily for factory use. The smaller types could be retained and improved to exploit the fresh fruit trade.

Local Strains.

Queensland's entire papaw production is based on locally-developed strains of the dioecious type with male flowers and female flowers in separate trees. Although somewhat mixed, these strains have distinctive characteristics in individual districts, due to mass selection over a number of generations by a few growers.

In these local strains, a large proportion of the trees are vigorous, high-yielding and produce fruit which, although somewhat variable, is of acceptable trade quality. Within some strains, material exists which possesses a high degree of resistance to ripe fruit rots. It seems that the local practice of mass selection has effected an improvement in this direction.

For some years now, there has been a growing awareness in the industry of the value of these local "varieties" for use in particular districts. Mass selection from high-yielding trees of good quality fruit is practised by the majority of papaw growers and a few practise hand-pollination in trees selected for seed which offers the best prospect of retaining the existing types.

Following upon the good performance of two local strains selected from Sunnybank and Brookfield material at the Redlands Experiment Station, a programme of purification of these local types was initiated. At the present time, third generation plants are under observation.

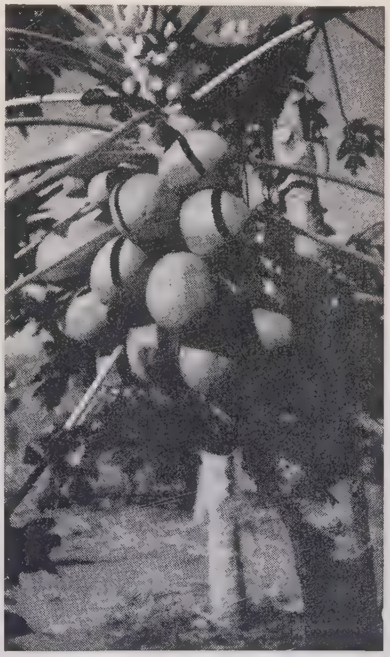


Plate 2.

Sunnybank. A local strain from the Sunnybank district which is now being purified at the Redlands Experiment Station.

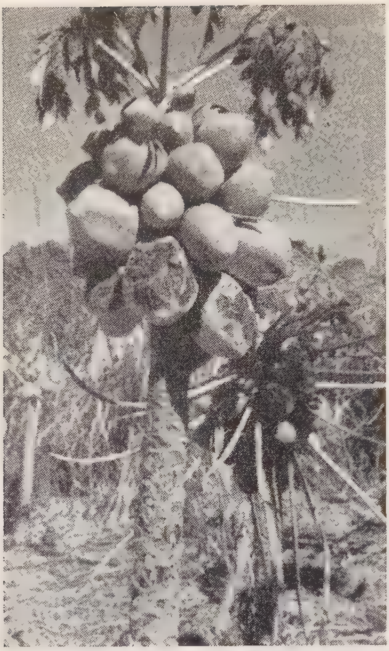


Plate 3.

Ripe Fruit Rots in the Papaw. The lower fruit show typical symptoms. Some locally-selected strains show resistance to infection.

Where To Get Seed?

Until seed of purified types of papaw suitable for production in particular districts becomes available, the practice of mass selection from the best trees available to each grower should be continued. In selecting trees for seed extraction, attention should be paid to yield, fruit quality, freedom from ripe fruit rots, size and shape of fruit to conform with market requirements.

Controlled hand-pollination of selected trees is a highly commendable practice. It is extremely simple. Just prior to opening, flowers on selected trees are covered with small paper bags so as to exclude foreign pollen. When the flower opens, the bag is removed and the protruding stigmatic surfaces are brushed with pollen from a selected male tree. Unopened, but mature male buds, from which the petals have been removed are used for this operation. Finally the bag is replaced on the treated flower. Several days later, when the flower is no longer receptive to pollen, the bag is removed and the young fruit labelled for further identification.

New growers should obtain fruit from one or two of the best growers in their district and use the seed as planting material for the first crop. Selections can be made from these trees to provide their own seed for future plantings.

The practice of obtaining seed from canneries cannot be too strongly condemned; extreme variability in plant type is to be expected when plantations are established from such mixed material.

Grass For Levee Banks

"A.M.," of Dalby, requires a grass suitable for covering levee banks and at the same time one suitable for sheep grazing.

Answer: The selection of a grass for these requirements depends to some degree on the location of the levee banks and how often the banks are required to control surface water flow. Where the moisture conditions of the soil are suitable, either Kikuyu grass or African star grass should be satisfactory. Care must be exercised in the grazing of African star grass as it contains a prussic acid yielding compound. Experiments in grazing have not resulted in stock losses, though there is always a danger of such accidents occuring. There is quite extensive use being made of African star grass on the northern Darling Downs.

Both grasses may be planted with sprig planting machines, using roots as the means of propagation. Where conditions do not favour the use of sprig planters try Rhodes grass, Priebe's perennial prairie, lucerne and barrel medic.

Green Fingers

LEMONS are rather sensitive to a shortage of water, and efficient irrigation is essential if the trees are to produce consistent crops of good quality fruit.

The really critical time is at flowering and immediately after. Any deficiency in soil moisture at this stage might result in a poor set. Even if the set is satisfactory, a heavy drop of immature fruit may occur later.

Keep an auger handy and use it every three or four days to check soil moisture in the root zone. The bulk of the feeding roots are in the upper 12 in. of soil. If these roots don't get enough water, the trees will be short, not only of water, but also of the plant nutrients which are taken up with it. The auger takes the guesswork out of irrigation and lets you know just when the crop needs water.

—*E. L. HASTIE,*
Adviser in Horticulture.

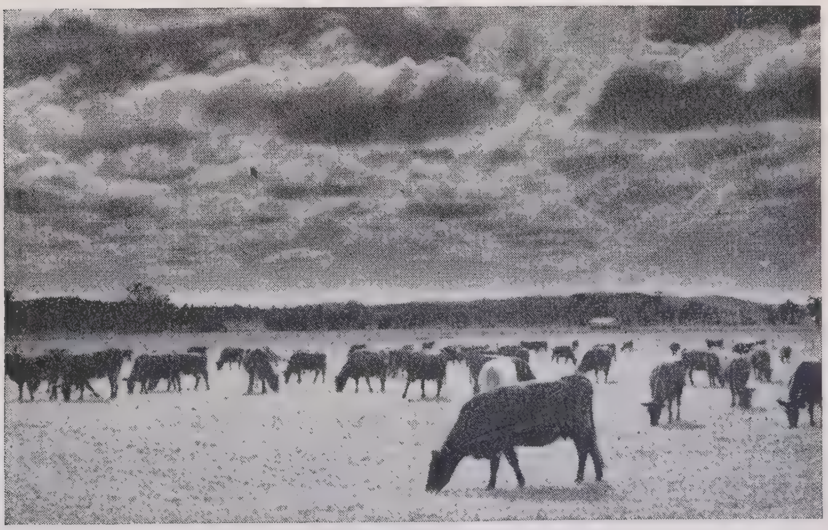
A COVER crop established in banana plantations in late spring helps to prevent loss of soil during the wet season. Besides reducing soil losses, a cover crop checks weed growth during summer and early autumn, and usually little cultivation is needed before March or April.

The Cristaudo and Reeves Selection varieties of cowpeas are recommended for cover crops. The seed should be broadcast at 20 lb. an acre. An application of 1 to 1½ cwt. of superphosphate and ½ cwt. of sulphate of ammonia to the acre at planting will help to produce a good ground cover and a bulky green manure crop.

In January and February, when growth of the cover crop is most vigorous, a light brushing may be necessary to prevent the cowpea growing onto the banana plants.

—*J. McG. WILLS,*
Senior Adviser in Horticulture.

Beaudesert Pasture



Tuberculosis-Free Cattle Herds. (As at 16th January, 1959.)

Aberdeen Angus.

G. H. & H. J. Crothers, "Moorenbah," Dirranbandi
A. G. Elliott, "Ooraine," Dirranbandi
W. H. C. Mayne, "Gibraltar," Texas

A.I.S.

M. E. & E. Scott, "Wattlebrae" A.I.S. Stud, Kingaroy
F. B. Sullivan, "Fermanagh," Pittsworth
D. Sullivan, "Bantry" Stud, Rossvale, *via* Pittsworth
W. Henschell, "Yarranvale," Yarranlea
Con. O'Sullivan, "Navillus" Stud, Greenmount
H. V. Littleton, "Wongelea" Stud, Hillview, Crow's Nest
J. Phillips and Sons, "Sunny View," Benair, *via* Kingaroy
Sullivan Bros., "Valera" Stud, Pittsworth
Reushle Bros., "Reubydale" Stud, Ravensbourne
A. C. and C. R. Marquardt, "Cedar Valley," Wondai
A. H. Sokoll, "Sunny Crest" Stud, Wondai
W. and A. G. Scott, "Welena" A.I.S. Stud, Blackbutt
G. Sperling, "Kooravale" Stud, Kooralgin, *via* Cooyar
C. J. Schloss, "Shady Glen," Rocky Creek, Yarraman
W. H. Thompson, "Alfa Vale," Nanango
S. R. Moore, Sunnyside, West Wooroolin
H.M. State Farm, Numinbah
Edwards Bros., "Spring Valley" A.I.S. Stud, Kingaroy
D. G. Neale, "Grovely," Greenmount
A. W. Wieland, "Milhaven" A.I.S. Stud, Milford, *via* Boonah
W. D. Davis, "Wamba" Stud, Chinchilla
Queensland Agricultural High School and College, Lawes
C. K. Roche, Freestone, Warwick
Mrs. K. Henry, Greenmount
D. B. Green, "Deloraine" Stud, Durong, Proston
E. Evans, Wootha, Maleny
T. L. and L. M. J. Cox, "Seafield Farm," Wallumbilla
J. Crookey, "Arolla" A.I.S. Stud, Fairview, Allora
M. F. Power, "Barfield," Kapaldo
A. H. Webster, "Millievale," Derrymore
W. H. Sanderson, "Sunlit Farm," Mulgildie
R. A. and N. K. Shelton, "Vuegon" A.I.S. Stud, Hivesville, *via* Murgon
R. R. Radel & Sons, "Happy Valley," Coalstoun Lakes
C. A. Heading, "Wilga Plains," Maleny
G. S. and E. Mears, "Morden," M.S. 755, Toogoolawah

Ayrshire.

L. Holmes, "Benbecula," Yarranlea
J. N. Scott, "Auchen Eden," Camp Mountain
E. Mathie and Son, "Ainslie" Ayrshire Stud, Maleny
C. E. R. Dudgeon, "Marionville" Ayrshire Stud, Landsborough
G. F. H. Zerner, "Pineville," Pie Creek, Box 5, P.O., Gympie
T. F. Dunn, Alanbank, Gleneagle

Friesian.

C. H. Naumann, "Yarrabine" Stud, Yarraman
D. J. Pender, "Camelot," Lytton road, Lindum
S. E. G. Macdonald, "Freshfields," Marburg

Guernsey.

C. D. Holmes, "Springview," Yarraman
A. B. Fletcher, Cossart Vale, Boonah
W. H. Doss, Degilbo, *via* Biggenden
A. C. Swendson, Coolabunia, Box 26, Kingaroy
C. Scott, "Coralgrae," Din Din Road, Nanango
R. J. Wissemann, "Robnea," Headington Hill, Clifton
G. L. Johnson, "Old Cannindah," Monto
A. Ruge & Sons, Woowoonga, via Biggenden
G. Miller, Armagh Guernsey Stud, Armagh, M.S. 428, Grantham
N. H. Sanderson, "Glen Valley," Monto

Jersey.

Queensland Agricultural High School and College, Lawes
J. S. McCarthy, "Glen Erin" Jersey Stud, Greenmount
J. F. Lau, "Rosallen" Jersey Stud, Goombungee
G. Harley, Hopewell, M.S. 189, Kingaroy
Toowoomba Mental Hospital, Willowburn
Farm Home for Boys, Westbrook
P. J. L. Bygrave, "The Craigan Farm," Aspley
R. J. Crawford, "Inverlaw" Jersey Stud, Inverlaw, Kingaroy
P. H. F. Gregory, "Carlton," Rosevale, *via* Rosewood
E. A. Matthews, "Yarradale," Yarraman
A. L. Semgreen, "Tecoma," Coolabunia
L. E. Meier, "Ardath" Stud, Boonah
A. M. and L. J. Noone, "Winbirra" Stud, Mt. Esk Pocket, Esk
W. S. Conochie and Sons, "Brookland" Stud, Sherwood road, Sherwood
Estate of J. A. Scott, "Kiaora," Manumbar road, Nanango
F. W. Verrall, "Coleburn," Walloon
C. Beckingham, Trouts road, Everton Park
W. E. O. Meir and Son, "Kingsford" Stud, Alberton, *via* Yatala
G. H. Ralph, "Ryecombe," Ravensbourne
Mrs. I. L. M. Borchert, "Willowbank" Jersey Stud, Kingaroy
Weldon Bros., "Gleneden" Jersey Stud, Upper Yarraman
D. R. Hutton, "Bellgarth," Cunningham, *via* Warwick
J. W. Carpenter, Flagstone Creek, Helidon
H. G. Johnson, "Windsor" Jersey Stud, Beaudesert
W. S. Kirby, Tinana, Maryborough
S. A. Cramb, Bridge st., Wilsonton, *via* Toowoomba
J. A. & E. E. Smith, "Heatherlea" Jersey Stud, Chinchilla
W. C. M. Birt, "Pine Hill" Jersey Stud, Gundiah
T. Nock, Dallarnil
P. Fowler & Sons, "Northlea," Coalstoun Lakes
F. Porter, Conondale
H.M. State Farm, Palen Creek
B. T. Seymour, "Upwell" Jersey Stud, Mulgeldie

Poll Hereford.

W. Maller, "Boreview," Pickanjinnie
J. H. Anderson, "Inverary," Yandilla
D. R. and M. E. Hutton, "Bellgarth," Cunningham, *via* Warwick.
E. W. G. McCamley, Eulogie Park, Dululu
Wilson and McDouall, Calliope Station, Calliope

Poll Shorthorn.

W. Leonard & Sons. Welltown. Goondiwindi

Butter of good keeping quality, with an even colour and texture can be made on the farm, provided certain procedures are followed.

Butter-Making On The Farm

By D. C. KEATING,
Dairy Officer, Bundaberg.

MAKING butter is still a regular home task on many properties throughout the State. This is particularly so in those areas in which dairying is not an established primary industry. Frequently the quality of this farm butter is not all that is desired and for those at a loss to explain why a knowledge of the correct method of churing and possible causes of the more common defects should prove valuable.

The quality of the raw material used in the manufacture of any food has a marked influence on the quality of the finished product and in this butter is no exception. Because dairy produce is subject to bacterial spoilage, every care must be taken both during the milking and subsequent cream churning and butter working operations to ensure that contamination does not occur.

Ripening of Cream. A certain degree of acid production occurs in cream which is stored for farm butter making. This is particularly so where cream is hand-skimmed after settling in open shallow bowls. In this instance the cream contains much skim milk. This acidity is not undesirable, if it is a result of the right types of bacteria, and therefore it is necessary to ensure that clean milking methods are used.

A ripening period of 12 to 24 hours between separation and churning is usually sufficient to produce enough acid.

Acid creams churn more rapidly and produce a butter flavour which is pleasant but not flat.

Pasteurising. While the natural bacteria found in cream form desirable acid, there are often undesirable types present also. These produce by-products which give rise to off-flavours and if in sufficient numbers will continue growing in the finished butter and affect its quality. In addition, raw cream may contain enzymes, for example, lipase which can cause off-flavours. In a manner similar to commercial practice, cream may be heat treated on the farm to restrict the activities of these bacteria.

The recommended method is:—

(1) Pour the cream into a billy and place the billy into a larger vessel of boiling water on the stove. A lid should not be placed on the billy as this will prevent the escape of volatile flavours.

(2) Raise the temperature of the cream to a minimum of 145 deg. F. and hold it at this level for some 20–30 minutes. During the period of heating and holding the cream should be stirred.

This operation can be done when the cream is fresh or after the ripening period depending on individual tastes.

It is necessary, however, to cool cream adequately after heating and store for at least three hours under cold conditions before churning is commenced.

Temperature. The temperature of the cream at churning plays a big part in determining the churning time and the body condition of the completed butter. A cream temperature of 50 deg. F. is most suitable. Storing cream in the household or dairy refrigerator overnight (prior to churning) should produce about the desired temperature.

A dairy thermometer for checking temperatures of cream is a most useful, if not essential, tool in butter-making operations.

Cream with a butterfat content of 35–40 per cent. is easiest to churn and butterfat losses from this cream should not be high. A low butterfat content in cream means longer churning times. The excess skim milk cushions the fat globules and prevents them from being brought together to form grains. Too high a fat content will cause unnecessary loss of butter fat in the butter milk.

For these reasons, cream from the farm separator is superior to hand-skimmed cream for churning operations.

When churning cream, do not fill the churn more than half full, nor less than a quarter full. This is important when enclosed churns are used. Too much cream in the churn will "whip up" and fill the churn with cream and air, thus preventing the bumping together of the fat globules. Too little cream in a churn, on the other hand, allows the cream to adhere to the walls of the churn and prevent adequate bumping together of the fat globules.

Before filling the churn it should be sterilized with boiling water and allowed to cool.

Churning. Churning is the most tedious part of home butter-making, and any reduction of effort involved is most appreciated. However, a certain minimum time will always be necessary if a good quality butter is to be produced. Usually cream at the correct temperature will churn in 25–35 minutes.

The hand-operated revolving churn is the most common type in use on Queensland farms. However, modern kitchen appliances such as electrical mixers are becoming increasingly popular as churns. While they possess the disadvantage of throwing the cream to the side of the bowl, no effort is involved and the cream can be watched during the whole churning process. The continued removal of whipped cream from the upper sides of the bowl will give complete and even churning in these appliances. The advantage of being able to watch the cream is that churning can be stopped at the correct stage.

With enclosed churns it is not possible to view the churning process. In this case the churn should be opened periodically to check the progress of the churning. With experience, the butter-maker will be able to assess approximately the time required between commencement of churning and when the buttermilk begins to separate from the butter grains.

The completion of churning. This is the most crucial stage in butter-making. Cream should be churned until the butter milk has run free and the butter fat is in the granular form, roughly the size of grains of wheat. The butter milk is then run off through a gauze strainer until the butter is completely free of milk.

A fault which occurs frequently is that the cream is churned until a large lump of butter is floating in the butter milk. This presents difficulties in draining, washing, and salting.

The butter should not be pressed with a pat to assist the removal of the butter milk, but merely allowed to drain freely.

After Churning. Washing of the butter serves two purposes: (1) It removes the final traces of buttermilk adhering to the butter grains. If this buttermilk is allowed to remain it may cause a sour-flavoured butter and reduce its keeping quality. (2) It will harden the butter grains sufficiently to allow better conditions for working of the butter while incorporating salt and water. Use wash water at a temperature slightly below that of the cream at the commencement of churning as this assists in hardening the butter. If a refrigerator is available the wash water can be cooled in this. Enough water should be added to cover the butter grains and allow them to float freely around when stirred.

The butter should be allowed to stand in contact with the water for some 5 to 10 minutes with light stirrings. Move the churn stirrer slowly through the water and butter to prevent packing of the butter. Do not use mechanical household mixers at this stage. If a revolving churn is being used a slow rotation of the churn will be sufficient. The butter can be washed more effectively when it is in small grains, and very little buttermilk remain.

Be certain the water is pure and free from any contamination, as certain water bacteria, if present, will cause off-flavours in the finished butter.

The quantity of salt to add is a matter of individual taste; it is necessary, however, to use a fine grain salt free of lumps. As a useful guide, one ounce of salt for each 3 lb. of butter should give satisfactory results.

Sprinkle the salt evenly over the butter grains and stir the mixture lightly to obtain an even distribution and allow the salt to dissolve.

Working the Butter. This operation has a major influence on the quality of butter and demands every attention. It is essential that the moisture and salt be evenly incorporated throughout the butter.

As no mechanical butter workers are available for home use, small wooden pats are often used for this operation. A tablespoon is a useful alternative or equipment of similar size.

Work the butter with the pats by pressing it to the sides of the bowl. Continue this process around the bowl, then bring the butter to one heap and press together. Drain off any free water which has left the butter.

This working and draining operation should be continued until no more free water leaves the butter. The butter has now incorporated the water or salt solution into its make-up.

A final working is now necessary to ensure that this moisture and salt is in as fine a form as possible. It should not be visible to the naked eye.

When patting the butter, press it firmly together and exclude air holes as much as possible.

Problem Churnings. The more common problems encountered with farm butters are listed, with the probable cause of the defect:

(1) *Extended churning time.* This could be a result of churning low fat cream or an incorrect amount of cream in the churn.

(2) *Uneven colour; Free moisture.* This usually indicates insufficient working to distribute the moisture and salt evenly. When cream churning temperatures are high the butter may not be firm enough to permit adequate working. This will sometimes occurr in the autumn months when low churning temperatures are necessary.

(3) *Rancid flavour.* This suggests chemical breakdown resulting from the action of raw cream enzymes. This fault is more common with late lactation milk and could also occur with the milk from a single cow rather than bulk herd milk. In these instances pasteurisation of the cream will correct the fault.

(4) *Sour flavour.* This is a result of bacterial spoilage. Butter should be washed more thoroughly and worked more evenly. In addition, check on the cleanliness of all utensils.

(5) *Bitter.* This defect may arise with late lactation milk.

(6) *Off-flavours.* Where milk is drawn from individual cows undesirable flavours may arise because of physiological disturbances in the animal. Milk from late lactation cows often gives rise to such defects. In addition feed or absorbed flavours may be the cause of this off-flavour.

Commercial butter-making is an art which requires much specialised equipment and attention to detail to ensure a uniform product. Its quality and composition is governed by regulation. Butter made on the farm for home use does not enjoy the special facilities, and in addition is not governed by such regulations. However, farm butter of good keeping quality can be produced with an even colour and texture, provided the procedures outlined are followed.

◆

Cow Manure as Fertiliz

"L.R.," of Proston, inquires about the value, use and application of cow manure.

Answer: Cow manure is a bulky but useful fertilizer. It is particularly beneficial when used as a top-dressing for pastures. When used for crops, an application of 10 tons an acre is generally required to produce an appreciable yield increase. Such quantities require the use of a manure-spreader even when the material is fine.

Ten tons of manure obtained from cows fed on other than highly nutritious rations, would supply plant nutrients equivalent to:

4½ cwt. ammonium sulphate;
1½ cwt. superphosphate; and
1½ cwt. muriate of potash.

Heavy applications of cow manure may on some soils require the application of additional potash.

The physical condition of the soil is improved when cow manure is applied, giving better soil structure and related benefits.

for the junior farmer

by J. PARK,
State Organiser,
Queensland Junior Farmers' Organisation.

Making Decisions

In club affairs, a great many questions crop up that might be settled in any one of several ways, and no one much minds which course is followed provided that the matter is dealt with promptly. Many of these are matters of routine, and are best left to be dealt with by the officers of the club. They are the day-to-day acts needed to carry out the policy laid down by the club.

On the other hand, there are matters on which people have very different views. If compromise is impossible, then the minority has to give way to the majority. This they probably do without too much fuss, because most people learn fairly early that they cannot have all they want all the time. In other matters, compromise between opposing views is often possible and advisable. Then, each side gives way a little in favour of the other, and the matter is settled in a way that gives each party some but not all of what it wants. On all matters on which conflicting views are held, spokesmen must have freedom to express their views at reasonable length, but what should they do if they find themselves in a minority and defeated in a vote? There is only one course of action open to them if they sincerely want their club to be a success: having heard the decision they must stick by it, repaying with loyalty the benefits they will obtain from membership.

Majority rule and comprise are often criticised, and sometimes a good case can be made out against them. As, however, the alternative is to hand over control of affairs to one person, or to a small group of people, it is better to learn how to follow these methods as necessary parts of the machinery of management. The principles on which this works should be that every individual is allowed to hold his own opinions, that he must have liberty to express these opinions at all reasonable times and in a reasonable way, that he must have some influence over the choice and actions of those set in authority, and that his rights must be safeguarded by the community as long as they do not interfere with the rights that belong equally to others.

An organisation that sets out to do all this cannot, in the nature of things be an easy one to handle, but when properly managed it can produce results that will be got in no other way. Its use, therefore, has to be learnt, by practice and by a critical examination of its results, by everybody. One of the things to be remembered is that the machinery of management, with all its meetings, debates, voting, committees, sub-committees and officers—not to mention majority rule and compromise—must not be allowed to become an end in itself. This can easily be prevented if all the members have clearly in their minds what it is that they want to get out of their clubs. If in the turmoil of committees, meetings and conferences they can produce a satisfactory answer to the question "What is the end in view?", then all is well.

Every word spoken in discussion, every resolution passed should be a definite step, however small, towards a definite end. Those who frame a resolution or motion that gives someone else a job to do should ask themselves if the wording gives all the instructions and guidance they themselves would need if the job were their responsibility. There is always a danger, even in a Junior Farmers' Club, that those who govern by passing resolutions do not give enough clear thought to the ways in which the resolutions can be translated into action. Resolutions should be clear-cut and practical, and be so worded that something *has* to be done.

Delegates

When a person is appointed by a group to represent them and voice their opinions at a meeting, that person is called a delegate. Thus, a club will send two delegates to a zone council meeting, and these delegates will vote on resolutions according to instructions received from their club. Some people make a difference between a "delegate" and a "representative" by saying that a delegate is obliged to act strictly according to instructions received from those who have appointed him, and that a representative has more freedom to act for himself. If we accept these definitions, then junior farmers attending council meetings and conference are part delegate and part representative. Delegate or representative, he must never fail to report back to those he represents.

Ideas Worth Trying

More and more Junior Farmers' Clubs are investing in a tape recorder. The purchase of such instruments for educational purposes can now be made without paying sales tax. The tape-recorder is invaluable for speech training, for recording talks and debates, and for recording music for the club social.

Many members living or working in towns see little or nothing of farm life, and have no real appreciation of the hardships and the pleasures of that way of life. If these members could visit farms, preferably those of club members, and if they could be given an opportunity to join in the normal farm activities, their interest in rural matters would be awakened or quickened, and they could be expected to become better club members.

Clubs might consider giving a subscription to some good farming magazine as a prize for club competition. After the winner reads each issue the copy could be placed in the club library.

* * *

Going camping this year?

Here's a Handy Guide to
make your Camping Holidays
Safer and Healthier:

BE CLEAN.

Be carefree, but not careless. Be proud to have your family set a fine example in personal and camp cleanliness. What you do or fail to do can affect the entire community.

BE DECENT WITH TOILET.

Always leave a public convenience the way you like to find it. This is one vital way to help prevent disease epidemics.

WASH HANDS.

Keep soap and water between you and disease! Make it a strict family rule always to wash hands thoroughly immediately after toilet and before touching food.

USE THOSE BINS.

Wrap all refuse in paper and put it in the bins provided. Always put the lid back on tightly to keep out flies and rats. If you're camping, clean up around the camp every day.

BEAT FLIES.

In crowded holiday areas, flies threaten clean people with diseases from the careless ones. Keep food and milk always covered. Spray regularly.

LEAVE NO LITTER.

Wherever you go picnicking, leave the place as clean as you found it. Burn or bury refuse and leave nothing to encourage disease-spreading pests.

BOIL WATER.

Water from a fast-running stream isn't necessarily safe. For drinking, boil any water that doesn't come from a tap.

PREVENT FIRES.

Take every care with your camp stove. Don't have clothing hanging near it. Light camp fires in well-cleared spaces and make sure they're completely extinguished.

KEEP SAFE IN SURF.

Foolhardiness costs lives. Obey all the rules of safe surfing. Bathe between the flags. Co-operate with life-savers.

GUARD AGAINST SUNBURN.

Don't ruin your holiday with the crimson misery of sunburn! Expose briefly at first and then a little longer each day. If you're fair take extra care!

DON'T OVERDO SUNGLASSES.

If you must wear sunglasses, make sure they don't magnify or distort in any way. Choose a light colour and wear goggles only when there's glare.

PREVENT ATHLETE'S FOOT.

Don't go barefoot into public bathrooms or dressing sheds. When you bathe, soap well between the toes, and dry thoroughly. A light application of zinc ointment is helpful.

DEFEAT MOSQUITOES AND SANDFLIES.

As a protection from bites, ask the chemist for a preparation containing dimethylphthalate. Rub a few drops on the exposed parts. To soothe bites, rub with calamine lotion or methylated spirits.

BE MODERATE.

Don't try to cram a year's fun into your holiday and so make recreation "wreck creation." Get ample sleep and regular meals.

Make commonsense your constant companion throughout your holiday.

—*Q. Health Education Council.*

Before Your Child Goes To School

TWO PRE-SCHOOL PRECAUTIONS THAT ALL PARENTS SHOULD SEE TO ARE IMMUNIZATION OF THEIR CHILDREN AGAINST DIPHTHERIA AND TETANUS.

Why should your child have a booster injection against diphtheria?

Because, although he may have been immunized at six months, by the time he is approaching school age, its effect will be wearing off.

He will soon be entering a new period in his life and spending a lot of time in the company of a great many other children in classrooms and playgrounds. There could be diphtheria carriers among them. And he might become infected. No matter how careful you are of his personal cleanliness, there is still a risk. Diphtheria plays no favourites. Rich or poor, clean or dirty, children are targets all the time they remain unprotected.

He is at a stage when any interference with his progress, through illness, can be a serious setback,

A booster injection will revive his earlier resistance to diphtheria and protect him throughout the years and in places where he is most likely to be exposed to infection.

This injection will not only protect *your* child, but it will also help stop the spread of diphtheria among other children.

Why should school children be immunized against tetanus at 18 months and booster injections given at proper intervals?

Because, though tetanus is not peculiar to children, they do run a much greater risk of infection. Their vigorous games, especially at school, bring minor injuries often caused by contact with the ground. The ground may harbour tetanus germs.

If the school-child is not already protected by immunization and the wound is not thought serious enough to warrant medical attention, tetanus may develop and then it may be too late.

Tetanus germs can live in dust and dirt for many years. They will lie in wait for such an opportunity as that afforded by the seemingly unimportant wounds children receive in the course of their play out of doors. In about one-third of cases tetanus enters wounds so small as to be practically invisible.

Tetanus develops quickly and its effects are horrible to see and to feel. It is often fatal.

Though difficult to cure, tetanus is easy to prevent. Children up to 15 years of age are most vulnerable to its attacks.

Do something about this danger right away . . . save your children and yourself from the terrors of tetanus.

Make your inquiries now. Your town or shire council may have facilities for free immunization. If not, ask your doctor.

—*Q. Health Education Council.*

"The Ringing Groove Of Change"

By E. T. HOCKINGS,
Editor of Publications.

> *"Growers would do well to take a lesson in packing from the Californians, who have been shipping apples, or from the Italians, who are shipping lemons to this colony, as those fruits . . . reach here in better condition and much more attractive state than our local fruit . . ."*

WELL, our student orchardist has graduated since Albert H. Benson wrote those words in his "Orchard Notes for December" column in the *Queensland Agricultural Journal* 62 years ago. And the process of education and growth has applied not only to fruit growing and packing, but to all plant and animal industries in Queensland.

In this, our State's centenary year, it is right that those whose interests lie in the land should look over their shoulders and meditate on the conditions under which their fathers, and their fathers before them, laboured. This can be done most entertainingly by speculating among the pages of early issues of the *Queensland Agricultural Journal.*

The journal had its beginning in the year 1897. In the December issue of that year, we read:

"ANOTHER PAYING CROP FOR QUEENSLAND. THE TOMATO. By Henry A. Tardent, Manager of the Westbrook Experiment Farm.—

"One of the great charms of life in these Australian Colonies is that here the poorest of men, the humblest tillers of the soil—provided they are gifted with some activity, industry, and taste—can indulge in the enjoyment of the most exquisite flowers and fruits, such as are in the old country available only to lords and wealthy capitalists provided with hothouses and other artificial heat-producing appliances . . . Among the new products met here, on landing, by the immigrant from Great Britain and Northern Europe, none perhaps meet with such a universal appreciation as the tomato or love-apple (*Lycopersicum esculentum*). If some do not take to it at once as a fruit, I know of nobody who does not like it as a vegetable or condiment. It is relished under the form of jams, jellies, chutneys, pickles, sauces, and salads; it is also excellent when stewed, fried, canned, stuffed with rice and minced meat . . ."

An Excellent Fish

In his notes on pisciculture in the journal of January, 1898, D. O'Connor writes: "We have running through Brisbane one of the finest rivers in Australia. Most of it is destitute of fish, excepting mullet, bony bream, and catfish; our laws prohibit the netting of the first, and the others are commonly regarded as worthless. Were the Palmer (Barramundi or Giant Perch) established in the Brisbane, a high-class fish on our tables need no longer be a curiosity. Palmer-fishing in the Brisbane would attract anglers from all directions, and those who go hence to Tasmania and New Zealand for fishing might do better by stopping at home. The distance from Brisbane to Rockhampton is not very great, we have frequent steam communication, and as an alternative route a railway nearly the whole way. The acclimatisation of the Palmer in the Brisbane River should not be regarded as impossible."

Machinery for Wheat Growing.

The journal of November, 1899, contains this extract from an article on the influence of machinery on the cost of wheat production: "It is undeniable that the extraordinarily low cost of wheat production in South Australia is largely due to the original invention of the stripper, and to the continual improvements that have been made in that machine and other farm implements. That finality has been reached is highly improbable. Our manufacturers are always keen for improvement. Their working creed seems to be the sentiment which the immortal Tennyson expressed—

Let the great world spin for ever
Down the ringing groove of change.

"Anyhow, when posterity doffs its hat and bows its head in homage to the dead pioneer agriculturist, the dead pioneer manufacturer will also be worthy of reverent remembrance."

Tropical Industries

In a note on sisal hemp, the December, 1912, journal says: "It is possible that the Mexican rebellion, and the terrible hurricane at Cebu, in the Philippine Islands, which is the principal seat of the Manila hemp industry, may account for the present high prices and foreshadowed higher prices for sisal fibre.

"Under the circumstances, even with the high wages ruling in Queensland for rural labour, those who are growing sisal here may take heart and look forward to good profits . . ."

War Years

The journal of September, 1917, contains the following note, headed "Dyes and Papers From Native Plants":—

"A most interesting and, under present war conditions, important exhibit (at the Brisbane Exhibition) was one by Mr. J. Campbell, of Cairns, in which the manufacture of paper from various fibrous plants indigenous to Queensland was practically described by the exhibition of the plant, of its fibre, and of the several processes the material underwent to produce the fine samples of good, tough, brown packing-paper.

"Also there was shown how a highly important industry could easily be established in the manufacture of dyes of various hues, even black—a difficult dye to produce. These dyes have all the characteristics of the aniline dyes, so largely imported from Germany previous to the war. Mr. Campbell has clearly shown that we need not be dependent on importation of these products, since it is quite possible to produce them in our own State."

The Farm Family

A journal issued during World War II., that of November, 1943, says: "Mention of the wartime work of women in rural industry naturally suggests the need for a wider appreciation of the practicalities of country life, especially in relation to the farm home, when post-war planning is undertaken. It is the woman on the land who makes the farm home, and on her success in home making the smooth working of the farm as a business very often depends. Therefore, no scheme of rural reconstruction will be complete without full provision for modern amenities in the farm home and in country centres . . ."

Big Task Ahead

Now that we are in our 100th year as a State, it is instructive to study the past. It may even be entirely gainful, if we manage to relate conditions of yesteryear to conditions of today, and in the light of comparison, make sensible plans for the future.

The Department of Agriculture and Stock could not, surely, be accused of vanity if it accepted some small measure of acclaim for its part in the improvement of conditions on the land in the last 100 years. At the same time, it is obvious that the alarming acceleration of human activity in just the last 20 years has made the task of tackling present-day problems one of immense magnitude.

We must therefore, continue to contribute our best endeavours to the job of harnessing science to the plough. And, concurrently, we must join hands with the farm family and walk encouragingly beside them along the road that leads not merely to more productive acres but to a better life.

◆

1788 ADVANCE AUSTRALIA 1959
TAKING SCIENCE TO THE FARMER
DEPARTMENT OF AGRICULTURE & STOCK
DEPARTMENT of AGRICULTURE & STOCK

Serving The Man On The Land

This float, prepared by the Department for the Australia Day procession on January 26, shows several of the ways in which the recommendations of scientists are passed on to Queensland farmers and graziers. This service, which is known as extension work, is given due prominence by the Department, which recognises, as Bertrand Russell puts it, that "Those who can act effectively as liaison officers between technical scientists and the public perform a work which is necessary not only for human welfare, but even for bare survival of the human race."

This Was The Farmer's Year

By Officers of the Marketing Branch.

Drought conditions caused a serious decline in farm incomes during 1957-58 and although in the latter part of the year there was a rapid improvement in seasonal conditions over the greater part of the State, economic recovery was adversely affected because of rising costs and deterioration of overseas markets.

Dry conditions throughout the year resulted in reduced production of many commodities and, coupled with price falls, they resulted in a deterioration in the balance of payments position. The value of exports was £172m. less than in the previous year, whilst the value of imports increased. The net result, therefore, was an excess of exports over imports of £28m. The corresponding figure at the end of 1956-57 was £274m.

Price falls, together with other difficulties, point the need for primary industry to devote more attention to the local market. Particularly is this the case with dairy produce and eggs. Consumption of butter in Australia, for example, has not kept pace with the increase in population. Consumption per head in 1938 was 32·6 lb.; in 1956-57 it had in fact fallen to 27·5 lb. Although Australians rank high in the per capita consumption of meat, consumption of beef and veal, which stood at 144 lb. in 1938, is now only 127 lb.

Although cheese consumption showed a pronounced rise in 1957-58 it is worthy of note that insufficient effort has as yet been made to produce those exotic types of cheese for which there has been an increasing demand since the war.

Any increase in the consumption of dairy products in all forms, including liquid and dried milks, would tend to reduce the uneconomic exportable surplus of butter.

United Kingdom Market

Traditionally the best customer for our agricultural products, the United Kingdom market has deteriorated in post-war years. The main cause is the impetus given to home production by large Government subsidies—£240m. in 1956-57 and £290m. in 1957-58. Agricultural output in 1957-58 was estimated at 63 per cent. above pre-war.

In the case of eggs, British farmers now produce 95 per cent. of United Kingdom requirements compared with 17 per cent. pre-war. Comparative figures for other products are as follows:—butter, 9 per cent. and 4 per cent.; cheese, 48 per cent. and 23 per cent.; meat, 64 per cent. and 50 per cent.

Further marketing problems on this important market arise from the policy of the United States of America in disposing of surplus farm products under Public Law 480, whereby surpluses are exported and paid for in the currency of the importing country.

Local Markets

In stressing the need for the export industries to develop more interest in the local market, attention must be drawn to those commodities the demand for which is at present largely met by imports. In particular, reference is made to tobacco leaf, cotton, peanuts, and oil-bearing seeds.

The problems peculiar to these industries are those of stable and satisfactory returns relative to the returns from alternative crops. A good deal of attention is being given to the establishment of the tobacco leaf and cotton industries on a sound technological basis so as to give the consumer the type of product required on the Australian market. The Tobacco Industry Trust Fund is an example of grower, manufacturer, and Government co-operation towards this end.

Pastoral

It is estimated that the Australian wool clip for 1957-58 was 1,426m. lb. greasy, or 9 per cent. less than in the previous season. The average Australian price for greasy wool was 62·27d. per lb. compared with 79·66d. per lb. in the previous season. Queensland sales were 705,657 bales, compared with 798,906 bales in the previous year, and the average price for greasy wool realised at these sales was 65·07d. per lb. compared with 84·09d. per lb. in 1956-57. Australian exports declined by 9 per cent. from 1956-57.

Meat production achieved a new peak for the 12 months ended December 1957, when output reached 1,273,000 tons. The continuance of drought conditions into 1958 reduced the turn-off of cattle for slaughter, especially in Queensland. Production of beef and veal in Queensland for the twelve months ended June 1958 was 14 per cent. lower than in the previous twelve months.

The 15-Year Meat Agreement with the United Kingdom provides an assured market for Australian meat as there is no restriction on the quantity which may be shipped.

Negotiations held in late 1958 resulted in the guaranteed minimum prices for beef and veal for 1961-64 being 9 per cent. less than the prices for 1958-61, making in all a reduction of 13·5 per cent. on the prices fixed for 1955-58. Guaranteed minimum prices, converted to Australian currency, f.o.b. are now:—

1955	18·4d. per lb.
1958	17·5d. per lb.
1961	15·75d. per lb.

For the three-year period 1958-61 there will be a free quota of 7,500 tons per annum for first and second quality beef. There will be no restrictions on lower quality meat. The 1957-58 quota of 15,000 tons covered all quality and all classes of meats (beef, veal, mutton and lamb). After 1961 there will be no restriction whatever on exports of any quality beef to any destination.

Minimum prices for lamb for the two years 1958-60 will be 5 per cent. below those for the period 1955-58. In the case of mutton the reduction is 15 per cent. All restrictions on the export of mutton and lamb to other markets have been removed.

An encouraging feature is the development of chilled beef shipping services to the United Kingdom via Torres Strait, which will enable meat to be landed in the United Kingdom within 28 days of leaving Queensland ports.

Dairy Products

But for the protection given the dairy industry by the Dairying Industry Stabilisation Plan, the year 1957-58 would have been a disastrous one. Australian production of butter and cheese was down by 9 per cent. and 22 per cent. respectively due to the drought. The consequent fall in farmers' incomes was accentuated by the collapse of butter prices on the United Kingdom market, while cheese prices were also unsatisfactory.

The fall in price was the result of accumulated stocks in cold store in the United Kingdom following abnormal imports from Eire, Finland, Poland and Sweden. United Kingdom home production also increased, both from higher cow numbers and greater production per cow.

The graph in Plate 1 shows the fall in prices of Australian butter sold in the United Kingdom since the termination of the long-term contract in June 1955. The extent to which the industry has been buttressed by subsidies paid under the Dairy Industry Stabilisation Plan is clear.

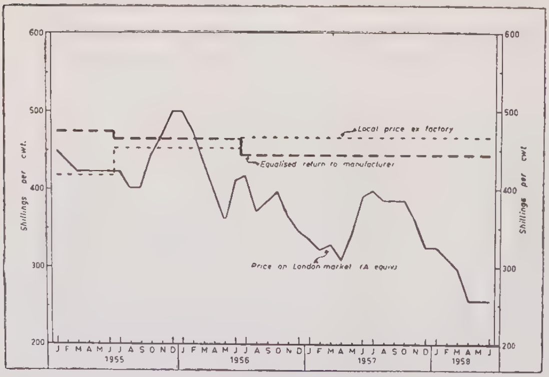


Plate 1.—Fall in Price of Australian Butter in the United Kingdom.

Eggs

The United Kingdom has again greatly influenced the returns to egg producers. Stimulated by subsidies which in 1957-58 were expected to exceed £48m., United Kingdom producers now provide 95 per cent. of United Kingdom requirements. Consequently other markets have had to be sought, and during 1957-58 only 18 per cent. of exports were sold in the United Kingdom, while 48 per cent. were sold to Western Germany. New markets have also been explored in Southern European countries.

Net payments by The Egg Board to its suppliers averaged 5·38d. per dozen higher than in 1956-57. This resulted directly from a decline in production, which meant that a lower proportion had to be disposed of on the less remunerative export market. The decline in production is directly attributable to the higher cost of feed occasioned by cumulative drought conditions.

Sugar

The international market last year was marked by high prices and wide fluctuations in daily quotations. From January 25 to November 18 international quotas were suspended. The suspension of quotas enabled Australia to export 767,832 tons of sugar in 1957, 148,000 tons in excess of the quota of 619,177 tons.

The International Agreement expired at the end of 1958, and talks under the aegis of the United Nations held in September led to the formulation of a new agreement for 5 years from 1959. The price range remains as in the current agreement.

The negotiated price for 1958 under the Commonwealth Sugar Agreement was fixed at £43 16s. 8d. stg. per ton, an increase of £1 13s. 4d. stg. per ton over the 1957 price.

The sugar industry is fortunate in the protection it receives on the United Kingdom market from the Commonwealth Agreement. The industry is continually striving to increase its efficiency. Bulk handling is already functioning smoothly at Mackay, Lucinda and Bundaberg and the industry is to provide similar facilities at Townsville and Mourilyan. The local market, too, is receiving attention, and there has been an encouraging expansion of the trade in liquid sugar delivered by tanker.

Fruit

Export prospects for canned pineapple products showed no improvement on 1956-57. Competition from other Commonwealth countries remains very keen and Queensland's prices have been undercut by both Malaya and South Africa. The position has been worsened by the United Kingdom issuing import licences for imports from the dollar area.

A notable feature of the horticultural industries in 1957 was the record plantings of strawberries in southern Queensland. This was partly due to the stimulus of a minimum price of 2s. 3d. per lb. for canning quality guaranteed by Northgate Cannery, as compared with 2s. per lb. in the previous year.

Apple exports to the United Kingdom are usually made via Sydney, because of lack of shipping space. In early 1958 space became available from Brisbane and the two shipments made, totalling 16,976 cases, were well received in the United Kingdom. Good prices were realised.

Grains

For the second successive year, the wheat crop in Queensland failed to produce sufficient grain to meet the State's normal requirements. All available supplies of Queensland wheat were reserved for flour milling. The whole of the State's requirements of stock feed, as well as supplies to supplement local wheat for flour, were imported from southern States.

In order to retain as much wheat as possible in Queensland in the face of heavy demand from New South Wales, also stricken by drought, the Government authorised a special drought loading of 1s. per bushel to be paid on all wheat delivered to the State Wheat Board. In addition there was a special freight concession equivalent to 3d. per bushel overall. These additional costs were borne entirely by Queensland consumers.

Surcharges, on Queensland sales, of 2s. 5¼d. per bushel on milling wheat, and 2s. 5½d. per bushel on feed wheat were added to the basic Australian home consumption price of 14s. 4d. per bushel. The quality premium on Queensland wheat for flour milling was raised from 2¾d. to 6d. per bushel for the 1957-58 crop. From the end of January the selling price for feed wheat was 16s. 11½d. per bushel bulk basis.

Part of the feed grain demand was met by barley, the season's production being held by the Board for the local market. Supplies of grain sorghum and maize helped to meet the feed demand for a time, but supplies of these grains were largely exhausted by September, 1957.

The improved seasonal conditions from March onwards resulted in heavy late plantings of summer grains. Heavy supplies came onto the market and feed grain prices fell sharply.

Tobacco Leaf

Production of tobacco leaf for the year 1957-58 was a record for the State. Deliveries to the Tobacco Leaf Marketing Board were more than 40 per cent. above the previous season.

The problems arising from an auction system of marketing, particularly those relating to average prices, grades, and unsold leaf, were the subject of considerable negotiations between the manufacturers and the Board; they have also been dealt with by the Tobacco Advisory Committee.

Qualifying percentages for import duty rebates to apply from July, 1, 1958, to June 30, 1959, were announced as 16½ per cent. for tobacco and 15½ per cent. for cigarettes. For 1959-60 the percentages will be 23½ per cent. and 22 per cent. respectively. These percentages, if met, would mean that nearly one quarter of the tobacco used in manufacture in Australia during 1959-60 would be of Australian origin.

Cotton

Although cotton growers have had the advantage of guaranteed returns for many years by way of bounty from the Commonwealth Government, growers have considered the guaranteed price too low and the term of the guarantee too short to induce them to extend their planting; it has also been difficult to attract new growers.

The present guarantee of 14d. per lb. which expires in December, 1958, will now be continued for five years from January, 1959. A longer term guarantee would have further stimulated the heavy investment in equipment in labour-saving machinery, a necessary prerequisite to any marked expansion in cotton growing.

Australian spinners use about 80,000-90,000 bales of cotton each year, of which 3,000 bales are home-produced. Apart from cotton goods, imports of raw cotton cost over £6m. annually. There is thus plenty of scope for increased production of raw cotton, which could make a worthwhile contribution towards an improvement in the balance of payments position.

Peanuts

Peanut growers in the past season benefited from better growing conditions, and there was a substantial increase in plantings. The crop was more than double the 1957 crop of 8,600 tons. Artificial drying experiments are being continued by The Peanut Market Board, the object of the experiments being to develop a dryer and a drying technique which could be used by individual farmers.

The Board's grading scheme, instituted for the 1957 crop, is considered to be very successful; growers are paid according to the grading of their deliveries. The average payment to growers for the 1957 crop was 12·385d. per lb., nut-in-shell basis. This is the highest pay on record, the next highest being that for the previous year, at 11·225d. per lb. It is of interest to see the effect of grading in the prices paid to growers. The highest pay for Virginia Bunch was 13·645d. per lb. and the lowest 10·495d. per lb. In the case of the Red Spanish variety, the corresponding figures were 12·337d. per lb. and 10·969d. per lb.

Application was made in 1956-57 to the Tariff Board for increased protection on both nuts and oil. Although some measure of assistance has been given, the beneficial effects of increased duty are largely vitiated by the removal of primage duties.

What of the Future?

Mention has been made of the severe effects of the drought, of the decrease in demand for our products on the traditional United Kingdom market, and of the fall in prices for our primary products.

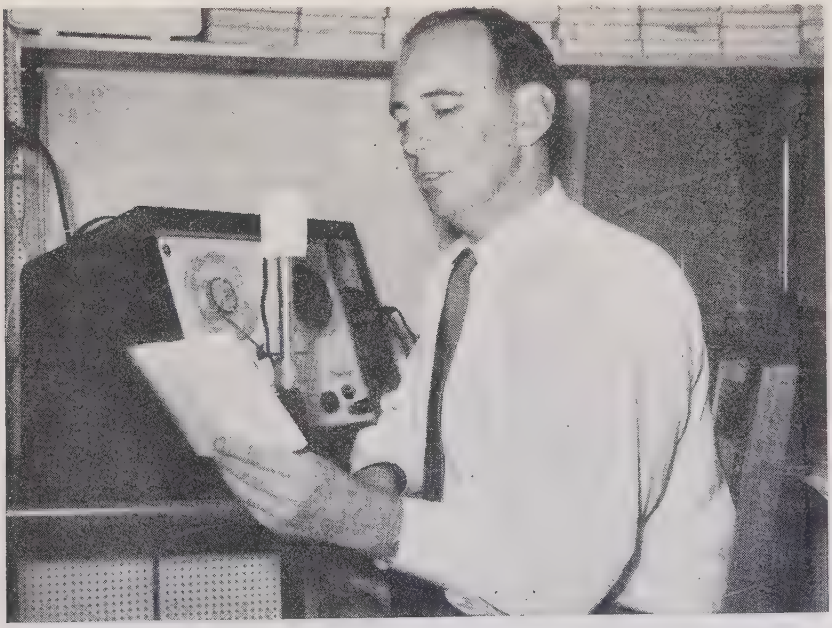
The answer to these problems lies in greater efficiency—more extensive water and fodder conservation, an intense drive for new markets, the greater diversification of production and products, and a constant fight against rising costs, particularly those which are to some extent within the control of the farmer; more attention must also be given to the home market.

The outlook is not entirely a dismal one. A welcome start has been made to sell more on the local market, by more attractive packaging and presentation of products. Various marketing boards are becoming "publicity conscious."

The revised terms of the meat agreement with the United Kingdom offer new possibilities for the meat export trade. Queensland exporters have not been slow to take advantage of this, and shipments of lower quality bone-out meat have already been made to the United States of America where there is a demand for this type of meat.

There is no doubt that the effects of the drought would have been more severe but for the better conservation methods practised nowadays by more progressive farmers.

Broadcasts To Farmers And Graziers



Mr. J. R. M. WOLFE, Extension Training and Research Officer, preparing "Agricultural Digest"—a series of short items containing valuable information for farmers and graziers—which is broadcast from the following country radio stations every week: 4QY, 4AY, 4RO, 4MB, 4GY, 4SB, 4QL, 4VL, 4ZR, 4GR, 4QS, 4IP, 4WK, 4AK. *Journal* readers may obtain the time of broadcast by inquiring from the nearest of these stations.

Crop and Pasture

EARLY cultivation of cotton before the weeds have become well established is relatively cheap and quick. In addition, weeds are not allowed to take soil moisture and plant foods from the growing crop.

Fit guards to the inside tines of your cultivators to prevent the build up of soil from burying the small plants.

You can cultivate closer to the rows this way and reduce the amount of hand chipping.

—*W. G. STEELE,*
Senior Adviser in Agriculture.

ALTHOUGH contour banks aren't the whole answer to soil erosion, they do reduce losses to harmless proportions.

More and more farmers are now becoming aware of this and are building contour banks. At the end of last year, over 1,500 Queensland farmers had started on soil conservation programmes. They had built and grassed water disposal systems and installed contour banks on more than 60,000 acres of cultivation.

South Burnett farmers have shown how quickly interest in soil conservation can build up once the value of the work is demonstrated. In 1954-55, 1,100 acres of land were contour banked, but during the last three months of 1958, over 4,000 acres were protected.

—*J. E. LADEWIG,*
Chief Soil Conservationist.

FARMERS purchasing seed for autumn planting are advised to pay particular care and attention to its purity and germination.

A lack of the knowledge of these particulars can lead to disappointing yields or financial loss. This may be due to lack of germination of seeds or infestation of clean paddocks by the introduction of noxious or undesirable weed pests.

Further, a knowledge of the germination capacity helps in adjusting the sowing rate and together with the purity gives a comparison of the value of other lines of seeds of similar kind.

Tests are conducted free of charge by the Department on samples representing seed for the farmer's own sowing.

Farmers are therefore advised to take advantage of these facilities by purchasing their seed requirements early and forwarding a sample, together with a covering letter, to the Seed Testing Station, Department of Agriculture and Stock, William Street, Brisbane.

—*J. E. BEAN,*
Inspector, Standards Branch.

HIGH temperatures are the order during mid-summer, and careful management is required to lessen the effect of hot conditions. Graze lightly and maintain a dense cover of pasture to insulate the soil from the sun's heat. Temperatures under a dense stand of pasture are from 30 to 40 deg. lower than on bare soil.

Use the pasture harrow sparingly. Heavy harrowing will remove protective litter and reduce clover and grass stand. A smoothing board or chain harrows are useful for manure spreading and less harmful to pastures. Don't allow water shortage to check pasture growth during heat waves.

—*A. NAGLE,*
Irrigationist.

Growing Our Own Centro Seed

By J. B. Gude,
Field Assistant,
Agriculture Branch.

An Ingham grazier has carried out the first successful mechanical harvest of centro seed on a commercial scale. This could be the first step in making us self-sufficient in centro seed. In Queensland, there is a growing demand for the seed of this legume, and the development of mechanical harvesting makes it possible for farmers to produce and market home-grown seed.

Centro (*Centrosema pubescens*), a tropical legume introduced and tested by the Department of Agriculture and Stock, is the most suitable pasture legume for the wet tropics in coastal Queensland. It is palatable, high in protein content, and increases the productivity of grasses in sown pastures.

Seed for planting, being imported, has been in short supply at times, and local production would have great advantages.

Mr. John Murray, of "The Orient," Ingham, has made the first commercial attempt to harvest centro seed mechanically, and he has been very successful. Approximately 15 acres of established pasture, a mixture of molasses grass and centro, yielded one ton of centro seed and four tons of useful fodder roughage.

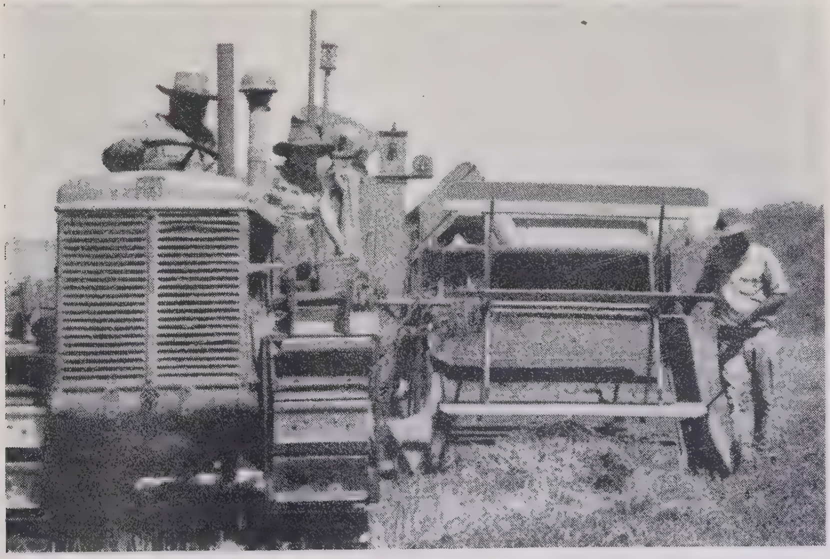


Plate 1.

The Header Picking Up a Windrow of Mown Pasture Ready for Threshing.

The seed was harvested in August, 1958, with the machine illustrated in Plate 1. Two harvesting methods were used. In the first, the pasture was mown short soon after the first centro seedpods opened. The "hay" was cured for a few days, and, when dried out sufficiently for threshing, it was picked up by the machine direct from the windrow. The second method was to top the pasture high, from 8 in. to 15 in., with the machine instead of mowing. This completed the harvest in one operation except for drying the seed on a tarpaulin before bagging. The second was the better method. The pasture could be grazed immediately after harvesting, it saved time and was light work for the machine.

The residue from both methods was valuable as stock fodder. August was generally fine and dry, but heavy dews limited harvesting to the hours between 10 a.m. and 5 p.m.

Yield of Seed

The yield varied from 320 to 480 lb. of centro seed a day depending on the stand. Mr. Murray's average yield of 130 lb. of seed an acre from his mixed pasture is most gratifying and he intends harvesting a larger area next year. Other graziers might follow his example and so establish the production of clean weed-free centro seed as a commercial success in Queensland.

* * *

339 Attend Beekeeping Field Day

THIS modern mobile honey extracting van, belonging to Mr. G. HAMMANT, of Oxley, was on display at the Field Day conducted by the Department, in conjunction with the Queensland Beekeepers' Association, at the Queensland Agricultural High School and College's apiary at Lawes. Altogether, 339 attended the field day to see the demonstrations of equipment.

Farmers Beat Deluge With Soil Conservation

By R. F. S. KELSEY,
Soil Conservation Officer.

JUNE, 1958, will long be remembered by Dalby farmers. Erosion struck heavily. The fertile, undulating scrub lands that nestle under the Bunya Mountains and the rich black soil plains for which Dalby is renowned were equally hard hit. This damage was the "worst ever" in several districts. Ample opportunity was provided to compare properties that had been protected with contour banks with those that were untreated.

June found the farm lands about Dalby in a fine state of seed bed preparation—if the crop had not already been planted.

The soil in a good year, because of long and well prepared fallows, has a high moisture content. It is not capable of absorbing much additional water.

A record 8 in. of rain fell in June, exceeding any previous registration for that month. Of this total,

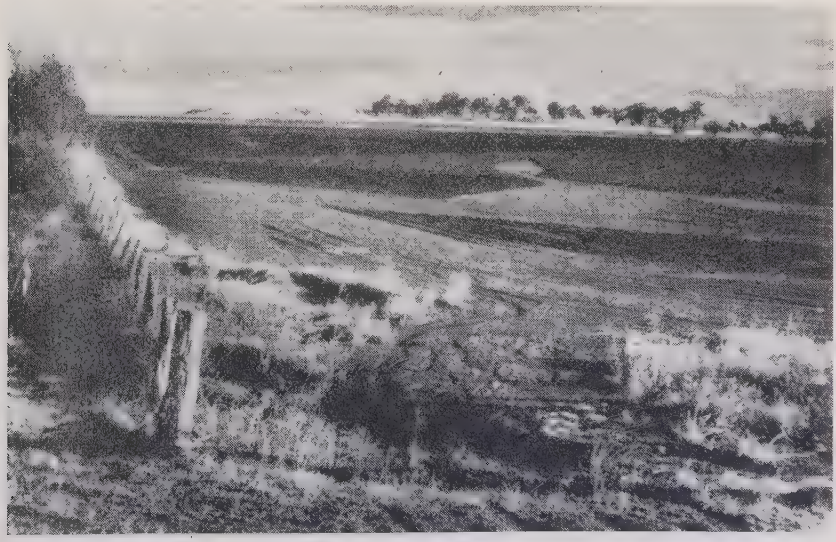


Plate 1.

Erosion Typical of That on Many Moola Farms Following Excessive Rains in June, 1958.

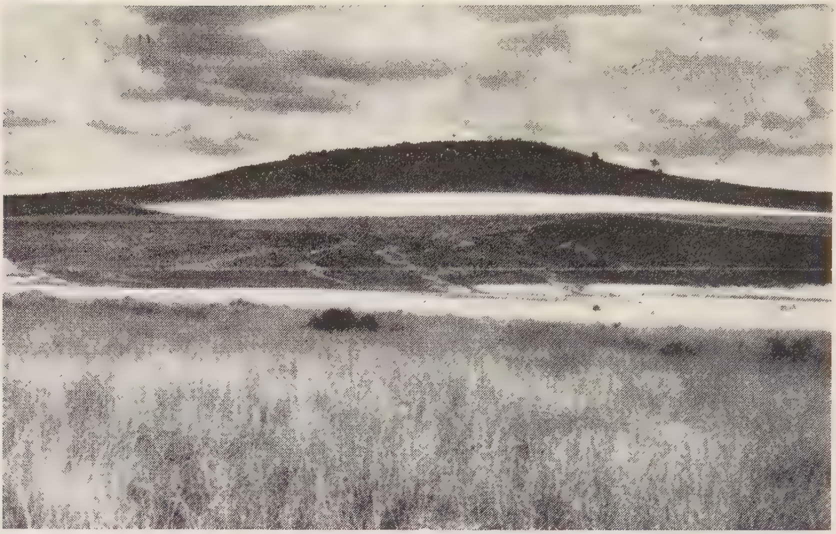


Plate 2.

Extensive Erosion on a Moola Farm During June Rains.

6 in. fell in three days. High midwinter rains are not usual. Most of Dalby's 26 in. average falls during the summer and early autumn.

Excessive Damage

The rainfall in the Moola–Kaimkillenbun area was as high as at any centre within the district. Extensive damage was caused to cultivation by gully and sheet erosion.

Many farms had their paddocks torn into strips. Up to 20 per cent. of the top soil to the depth of ploughing was lost from some paddocks.

Plate 3.

Farm Near Moola Protected by Narrow-Base Contour Banks.

Fortunately many of the Moola farmers have taken a lively interest in Soil Conservation in recent years. Where contour banks were installed they provided a striking example of their protective value.

Throughout the area the soil conservation earth works proved a complete barrier to the ravages of erosion.

Untreated Paddocks Severely Eroded

Untreated paddocks were an unsightly mess with eroded strips at 5 or 6 yd. intervals and seed bed preparation had to start over again—but not with the same soil nor with soil as fertile as that lost.

Silt fans on the lower portions of the paddock have proved as great a hazard as the gullies themselves. Because of their slow drying and boggy nature, the silted areas could not be planted.

Contour Banked Paddocks Undamaged

On paddocks protected with soil conservation measures, the surface was left entirely in order. Planting following the rains was able to proceed without worries of gullies and silt.

A newly contoured paddock on Mr. G. McKay's property at Moola was left undisturbed by the rain. In previous years this paddock was notorious for the amount of soil that was dislodged to silt, and stop traffic on, the road below.

Plate 4.

Wheat Growing on Contour Banks on Mr. R. Dun's Property at Moola.

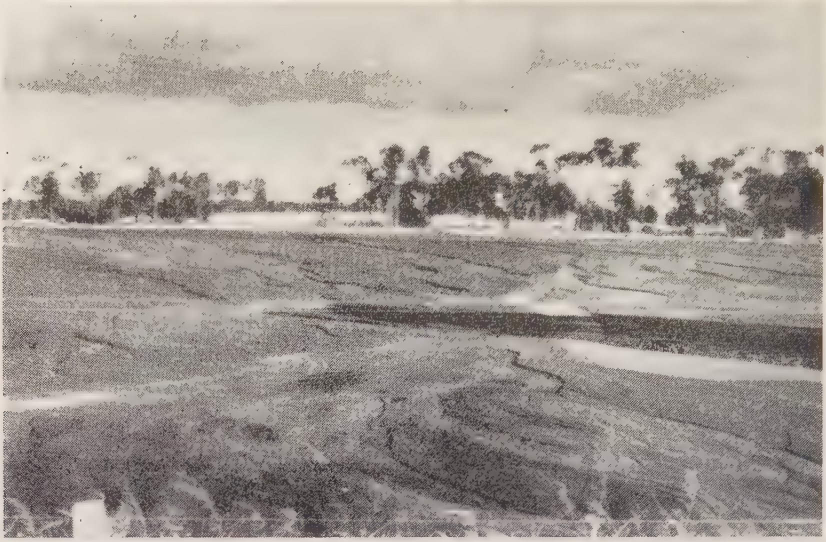


Plate 5.

Mr. Dun's Only Unprotected Paddock in June 1958. It was seriously eroded; now partly contoured. See Plate 6.

There were numerous examples of the efficiency of new earth works in paddocks that had previously suffered severe erosion.

Mr. C. Stockwell, in the Kaimkillenbun area, was completing a paddock of contour banks as the rains started. This particular paddock had in the past been severely eroded. Although the banks had no time whatever to settle, they provided the complete answer.

Delays Can Be Costly

"Don't put off 'till tomorrow" is the motto of Mr. R. Dun, of Moola, following the June disaster.

Mr. Dun has been active in furthering the work of soil conservation in the Moola area. Most of his property is contour banked. However, one big paddock remained to be done and erosion hit it hard in June.

Broad stretches of the paddock were sheeted away. Silt covered the road below to a depth of 15 in. for over 100 yd. and held up traffic.

Such deposits represent only a fraction of the gross soil loss. Most remains in suspension in the water and is carried on to silt creeks and rivers.

This paddock of Mr. Dun's has since been worked and planted but this time with a difference. A quick road-side conference between Mr. Dun, interested neighbours, the Wambo Shire Council engineer and a soil conservation officer found everyone cooperative. A soil conservation plan was discussed and approved. It was unanimously agreed that by contouring the paddock there was everything to gain but nothing to lose. Before any further work was done in the paddock, diversion and contour banks were constructed.

Plate 6.

Newly Constructed Contour Bank in the Eroded Paddock Shown in Plate 5.

Further banks are needed but these must wait the construction and grassing of a waterway through the paddock.

The Moola farmers are pleased to work with contour banks. As one farmer puts it: "They just set a paddock off."

* * *

The Common Mallard

RECENT requests have sought the introduction of the common mallard into Queensland as a potential game bird.

The Department, as the authority responsible for administering fauna conservation in this State, is not in favour of the introduction of this duck, as the proposal has a number of undesirable features.

Briefly, this duck, known as the common mallard, inhabits each of the northern hemisphere continents. It lends itself to domestication and is the progenitor of nearly all our domestic breeds. It is probably the world's best-known game duck.

As far as Queensland is concerned, exotic species when they become established usually do so to the detriment of native animals. In the case of the common mallard, if it did become established here, it would do so by taking over part of the available basic food, water and shelter requirements of other native duck species.

The common mallard crosses freely with some other wild duck species, including the Australian black duck. In America, it has crossed with the American black duck, gadwall, pintail, baldpate and green-winged teal. This is another feature not desirable so far as the conservation of particular native species is concerned.

Overseas, the common mallard is partial to wheat, barley, maize, rice and buckwheat, and in some places is a pest. There is, therefore, a strong possibility of crop damage from this species if introduced to Queensland.

—*C. ROFF,*
Fauna Officer.

Bucket and Bail

MILK and cream cans will sometimes rust in immersion type cabinets causing a loss to the producer both in terms of equipment and milk quality. This rusting indicates either unsatisfactory water or unsuitable cans.

The water in the cabinets should be changed regularly and kept free from foreign matter. A few minutes spent wiping down the outside of the cans before placing them in the refrigerator is a valuable precaution.

If the water becomes acid, rusting will occur. The water can be maintained in a alkaline condition by adding small quantities of caustic soda or soda ash.

Placing untinned cans into water is only asking for trouble. All surfaces should be satisfactorily tinned.

—K. FITZGERALD,
Dairy Officer.

ALTHOUGH silo gas poisoning hasn't been recorded in Queensland, farmers who make silage in towers or deep pits should always be alert for possible trouble. Either or both of two gases, carbon dioxide and nitrogen dioxide, cause the poisoning. They may be given off while a crop is being ensiled or a few days afterwards. Both gases are heavier than air and tend to occupy the space immediately above the material being ensiled.

As a precaution, you should lower a lighted candle to the full depth of the silo each morning before entering it yourself. If the candle goes out, there isn't enough oxygen for you. If detected, you can remove these gases with a blower or by vigorous action with bags on long sticks.

—A. HUTCHINGS,
Senior Adviser in Cattle Husbandry.

THE need for the most efficient use of pastures and grazing crops has brought the electric fence to hundreds of Queensland farms. But if the fence is to do its job properly, it must be in good working order.

The most common faults are a weak shock or no shock at all.

You can find out whether the fault is in the unit by disconnecting the high tension lead to the fence and seeing whether you can get a spark. A poor spark or no spark at all shows that the fault is in the unit. A flat battery, broken wires or loose or dirty connections may be the cause of the trouble. If the fault persists, the unit should be sent in for expert attention. If the fault is in the fence itself, check the earth and connections. If it still persists, look for broken or trailing wires, damaged insulators or an improperly insulated reel.

—C. G. WRAGGE,
Agricultural Engineer.

Plans For April

Supplementary feeding will extend the lactation period.
Change the separator oil.
Plant winter cereals for grazing.
Inoculate all legume seed.

Green Panic And Its Use In Pastures

By N. F. FOX, Agrostologist, and
R. G. WILSON, Adviser in Agriculture.

GREEN panic has earned a place as one of Queensland's important summer-growing, perennial, pasture types. Its remarkable drought hardiness, palatability and rapid growth-response to rain are the main reasons for its increasing popularity and spread within the 25 to 70 in. rainfall belt of this State.

Green panic is a fine-stemmed guinea grass. Botanically it is *Panicum maximum* var. *trichoglume*. The importance of this grass as a sown pasture species has increased with the years following 1936. It is most significant that in the Royal National Association's Pasture Competitions conducted within this State since 1954, the winning rain-grown pastures in Class I for areas receiving between 20 in. and 45 in. of rain a year, have been green panic-lucerne pasture mixtures.

The guinea grasses are native to Africa but they have become naturalized throughout the tropical and most of the subtropical world.

Plate 1.

Topping Off Herefords on Green Panic on "Madoora," Gayndah.

Plate 2.

Seven-Year-Old Green Panic at Mt. Wyangapinni, Pittsworth, Showing Excellent Recovery after the 1951 Drought.

The fine-stemmed strain which was to become known in Queensland as green panic almost certainly came to this country from Africa. Plants were recognised at "Madoora", near Gayndah, about 1936. Their feeding value and vigour so impressed the owner, Mr. Petrie, that he encouraged their spread to embrace some 800 acres of softwood scrub country. (Plate 1). Local farmers obtained seed, and sowings in the area and in adjacent district increased. Considerable quantities of seed are now produced, and the central Burnett at present produces the bulk of the State's green panic seed. The northern Darling Downs is also becoming an important source of seed, aided greately by the higher degree of farm mechanisation found in the area.

Where it Grows

The distribution of green panic in Queensland is probably wider than any other improved pasture species, including Rhodes, paspalum and kikuyu grasses. Green panic is grown on the Atherton Tableland, and the central and southern coasts. It has spread inland and is grown successfully in the Fitzroy, Dawson and Burnett River catchments. To the south, green panic has been sown in the Brisbane Valley and has become increasingly popular on the Darling Downs.

Pastures of green panic have come into being in the Maranoa, while a small isolated stand has persisted for the past 5 years as far west as Charleville, within the 20 in. rainfall belt. It requires a summer rainfall and grows best in regions lying between the 70 in. isohyet in the north and the 25 in. isohyet on the Darling Downs.

During the 1957-58 drought, green panic (as with buffel grass) created drought history in districts where rainfall for the year averaged as low as 11 in. Prolonged, record-breaking heat waves checked it until periodic showers encouraged it into rapid growth which provided valuable feed for starving sheep and cattle in many centres. Its growth is checked by frost but in most districts it is able to make new growth during the warm spells usually experienced each winter.

Green panic's climatic adaptability is matched by a wide tolerance of soil conditions. It will grow in acid or alkaline soils (pH5 to pH8) but best results occur from slightly acid (pH 6.5) to neutral soils (pH 7.0).

The plant will grow on the dark, grey-brown, self-mulching, clay loams of the open forest or downs country. These soils are usually well supplied with phosphorus and lime. They are neutral to alkaline in reaction. It is, however, often difficult to retain on the heavier, dark-grey clays that crack badly when dry, with resultant damage to plants. This is important on the open Darling Downs where plants on these soils are more vulnerable to heavy frosts. Management is a key factor on these plains. Sufficient growth should be left for crown protection prior to the onset of winter.

Green panic pastures have also been successfully established on the grey-brown, yellow-brown and brown brigalow soils.

The grass grows extremely well on Queensland's red loams, particularly on the softwood scrub soils of the Burnett Valley and Darling Downs. These soils are usually acid and phosphates tend to be unavailable.

Plate 3.

Green Panic on Poor Spotted Gum Country on "Madoora," Gayndah.

Plate 4.

Three Months' Old Green Panic on Cultivation at Peachester.

From the coast to the Maranoa, reasonably fair green panic pastures have been grown on poor soils with sandy or loamy textures. Their success under these conditions depends largely on good management. Green panic is tolerant of shade and will grow where lantana dominates and on the coastal scrub soils.

Where a soil lacks adequate nitrogen, green panic generally responds most markedly (in density, height, seed yield and colour) to adequate applications of nitrogenous fertilizer.

What it Looks Like

Green panic is a summer-growing perennial. It is tall and tufted. It will grow to 5 ft. or 6 ft. but normally the foliage will not exceed 3 to 3½ ft.

The seed head is a typical panicle borne on a slender stem, and extruded well above the foliage. Seed is easily harvested with a header—particularly the "All-crop" types incorporating a "reel-bat" ahead of and above the comb.

As the green panic stand matures, well-developed and spaced tussocks or crowns occur. These crowns will develop to a diameter of 12 in. or so. At this stage, if managed correctly, green panic pastures are usually at their hardiest.

Strong crowns covered with short, woody stems are protected from frost, heat and close-grazing damage. Following rain, these crowns are rapidly covered with succulent feed. Within the spaces between the plants, other grass and legume components such as lucerne, barrel medic, centro, glycine, prairie or wimmera rye according to the district, are able to grow.

In some coastal districts, renovation is conducted to destroy the tussocks and encourage the softer seedling regeneration of the stand.

Frosts may damage exposed green panic crowns. Where frosts are usual, the pasture should be managed so that the green panic will enter the winter with sufficient top growth to protect its crown. Winter bulk can also assist in suppressing new growth in a "false" spring.

The grass is palatable, particularly in the flush-of-growth stage. Its nutritive value is comparatively high. It has marked shade-tolerance and will grow amongst timber and in scrub fringes. It has even grown under dense green brigalow, and has been observed under the leafy wilga trees of the western Darling Downs. In coastal districts, and the higher rainfall scrubs of the eastern Darling Downs, green panic has competed with and dominated tall weeds and lantana.

How to Plant

Green panic has a smooth seed which runs freely through drills and which can be sown easily from the air. It can be sown during September-October or more safely in the January-February period. Except in frost-free areas, later sowings run the risk of frost injury. It is preferable to broadcast or drill it in at 2 to 4 lb. per acre. In some instances, successful sowings into scrub burns or into carefully-prepared seed beds have been made at rates of 1 lb. per acre or less.

Good quality seed is essential at these rates.

Many experienced growers prefer to sow at the rate of 6 to 7 lb. per acre when using their own seed but this is not justified when purchased seed is used.

Plant on to a well-prepared seed bed or scrub burn. Best results on the Darling Downs and Maranoa occur following a 7 to 12 month fallow;

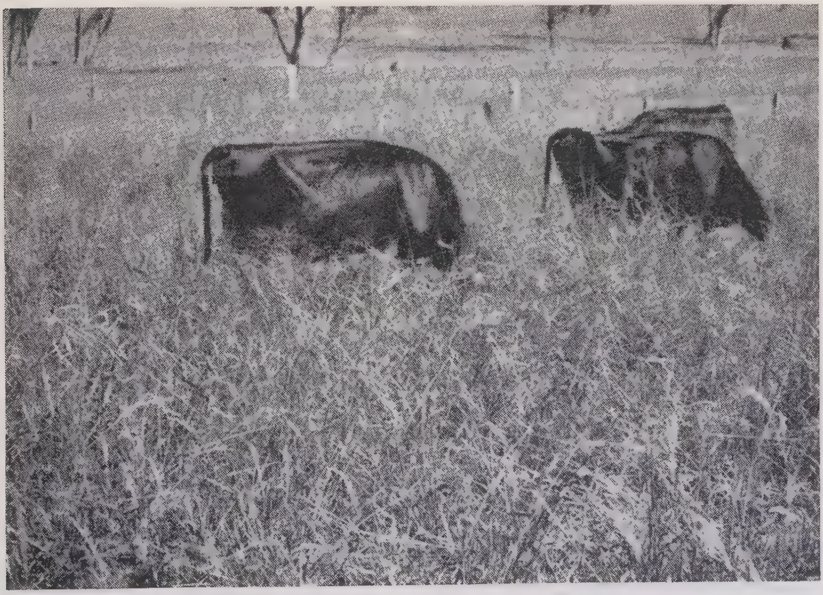


Plate 5.

Dairy Cattle Grazing a Green Panic-Lucerne Pasture in the Monto District.

Plate 6.

Green Panic Invading Scrub in the Gayndah District.

particularly those following a sudan or sorghum crop. Some growers oversow their grain sorghum crops with green panic, with the intent of harvesting sorghum seed for home use and reverting the cultivation to pasture.

Excellent drill-sown stands have been produced in loamy soils by sowing high quality seed of 40 to 50 per cent. germination value at ½ to 1 lb. per acre in 28 in. to 42 in. contour spacing. Shallow plantings at 1 in. or less are generally desirable; though satisfactory results with good seed on the Darling Downs have followed from 1½ to 2 in. sowing depths.

The seeding rate to be used will depend on the viability of the seed and the seed-bed preparation. Poor strikes are often traced to faulty seed. See that bought seed is up to standard. The minimum germination prescribed by law is 15 per cent. The ability of the seed to lie dormant in the soil until favourable conditions occur is interesting. For example, many reported cases of delayed germination have occurred on the Darling Downs. Following the break of the 1957 drought, seed sown some 3 years previously germinated to produce good pasture.

When sowing with lucerne or barrel medic, the lot can be mixed and sown through every run of the small seed box or fine side of the combine suitably reduced or checked to secure the desired rate of flow. Usually the minimum wheat setting is used, preferably with a reduction cog or with a "check" inserted in the hopper to regulate flow. At times, only every second run may have to be used in order to obtain the desired rate. With the more modern combine-drills little trouble is usually encountered, as low settings are more easily obtained. Spaced contour row sowings involve a little more trouble when using two rows green panic and one row lucerne —as is recommended on the drier areas of the Darling Downs.

On a small scale and in broken country, such as hill tops, vegetative plantings are made at times, by topping and hand-separating plants into root divisions and transplanting these spaced at intervals within the area. This method, with initial protection from stock, is usually most successful.

Aerial sowing into the new ash of scrub burns is also quite successful.

Green Panic Pasture Mixtures

The species has been sown alone to produce a mono-specific sward or row pasture. In sward form, green panic pastures have persisted on fertile soils for up to 20 years. On properties where Rhodes grass is also grown, there is a tendency for the aggressive creeping Rhodes grass to invade and dominate the green panic.

In drought years, Rhodes grass may be killed out or greatly reduced when in competition with the more drought-resistant green panic. However, in good seasons, Rhodes grass actively invades and suppresses the green panic. Except under very careful management, stock also assist the Rhodes invasion by favouring the green panic and leaving the less-palatable Rhodes grass to grow unhindered.

Green panic will combine with a variety of legumes to produce a well-balanced pasture mixture. Lucerne at 1 to 1½ lb. per acre is the most useful legume to sow, with green panic at 3 to 6 lb. per acre in the Burnett, Maranoa and on the Darling Downs. (Plate 7). Phasey bean is mainly recommended for pioneer sowings, in rough country and in scrub burns. Sowing rates as low as 4 oz. per acre or less are used for this legume. On

Plate 7.

A Well-Managed Green Panic-Lucerne Pasture at Maclagan on the Northern Darling Downs.

the Darling Downs and in the Maranoa, barrel medic at 1 to 1½ lb. per acre is also included with the lucerne and green panic.

Where row plantings are used, lower planting rates are required. The rates may also be reduced when seed quality is high and the seed bed preparation is good.

Successful management is generally based on a modified "lucerne rotation" method (that is, graze for up to 2 weeks and spell for 4 to 8 weeks—depending on the season). On the Darling Downs, 5 to 8 years old green panic-lucerne pastures are carrying on the average 1 cow to 3 or 4 acres. In good seasons with mild, moist winters, carrying capacity on some favoured scrub areas is as high as 1 cow to 1 or 2 acres. Under drought conditions, this ratio may widen to 1 to 6 or 8. Contour-row green panic-lucerne pastures established for 3 years in the Chinchilla area are carrying stock at the rate of 1 cow to 2 or 3 acres.

On dark, grey-brown forest soils in the central Burnett, a stocking rate of 1 beast to 4 acres is considered satisfactory for this mixture. In reasonably good years, the pasture has maintained stock in condition and produced a steady liveweight gain. Its production per acre varies from two to five times that of native pastures, depending on the type and state of the native pasture. It is usually four times better.

Near Mundubbera and on the Darling Downs, green panic-lucerne pastures have been developed to a high degree. They are either renovated annually or contour-ripped at 2 ft., 11 ft. or 22 ft. intervals down the slope. Green panic seed is harvested by hand, with the reaper-binder or by direct heading. The surplus early summer growth has been conserved as baled hay and silage.

Cattle and sheep find it palatable. It is fattening, and dairy stock milk well on the pasture. At Mundubbera, one 26-acre area sown to green panic and lucerne in 1954 produced during 1956, (an exceptionally moist year) 350 lb. of green panic seed, 1,700 bales of silage, 500 bales of hay and grazing for up to 95 head between August and November.

On the poor coastal soils, green panic has also been used with success in mixtures with molasses grass and centro. Molasses grass tends to fill in or provide ground cover between the tufted green panic plants in the same way that barrel medic, rye and prairie do on the Darling Downs.

Sow green panic at 3 lb., molasses at 1 lb. to 2 lb., and centro at 2 lb. as a mixture per each acre. As in the case of lucerne and barrel medic use only inoculated centro seed and cover as soon after broadcasting as possible. If seed of glycine, fine-leafed stylo or desmodium is available, inoculate these too with the relevant strain of bacteria and, if desirable, sow with the mixture at the rate of ½ lb. of each to every acre in addition to the 2 lb. of centro.

The use of these "tropical" legumes assists to build soil fertility and provide the nitrogen necessary to maintain green panic on these soils.

Practise a system of deferred grazing. Allow green panic to make growth to 6 in.-12 in. before grazing, but in February-March, ensure that the green panic sets seed.

Molasses grass should be allowed to seed in April-May. This mixture has persisted under a system of deferred grazing for a number of years on the sandy soils in the Bundaberg district.

Seed, Hay and Silage

Green panic seed is harvested in three main ways—by direct header harvesting, by reaper-binder, followed by stooking in the field and machine threshing, and finally by the more laborious hand-harvesting method in rough scrub areas.

Header-harvesting is a fast method and is preferred by most growers on the Darling Downs. Yields vary from 1 bag (55 to 60 lb.) to over three bags (180 lb.) per acre. As many immature seeds are harvested in the process, heating and the ultimate deterioration of the product are inevitable unless drying of the seed occurs. This entails the provision of sufficient floor space for spreading and turning prior to bagging. Greatest yields with the least effort are obtained by means of the modern "all-crop" type header-harvester.

A number of farmers with limited floor drying space incorporate with header-harvesting the *reaper-binder* method. This involves leaving the sheaves in stooks to dry in the field, threshing then taking place after a suitable interval. To minimise seed losses while "stooked", the heads are tied in so that most of the seed will fall into the sheaves. Yields are in the vicinity of 160 to over 200 lb. per acre.

Hand harvesting and "sweating" is still used in rough country where it would be impossible for the use of orthodox equipment. Sufficient floor space for seed drying as in the header-harvester method limits the area to be harvested. Yields are usually heavy, but seed viability may be greatly impaired by allowing high temperatures to develop in the "sweat" heaps. Temperatures in these heaps should not exceed 90 deg. F.

For home supplies some farmers use a harvesting box or tray. This is attached to the front of a vehicle or tractor which is driven into the seed stand at 8 to 10 miles per hour. Only the ripest seed is harvested and yields vary from 30 to 60 odd lb. per acre.

Plate 8.

Stooks of Green Panic Harvested for Seed in the Mundubbera District.

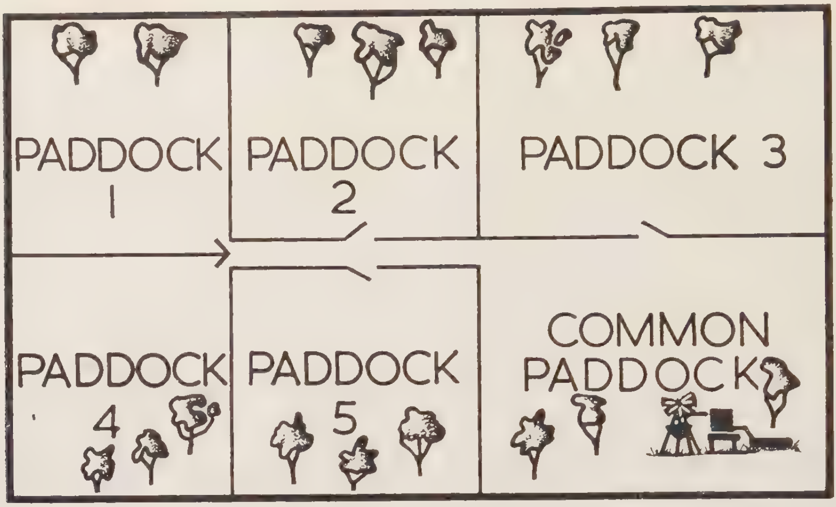


Plate 9.

Diagrammatic Layout for the Lucerne Rotational Grazing. Each paddock in turn would be grazed for two weeks, then closed up for eight weeks.

The germination percentage of green panic seed improves with storage for up to two years or so. It is often advisable to hold freshly harvested seed at least a season or 12 months in a dry, airy place before sowing.

To comply with the Agricultural Standards Act of Queensland, green panic seed for sale must have a germination percentage of 15 per cent. or greater.

Green panic or a green panic-lucerne pasture cut at the flowering stage makes a good hay. During the 1957 drought, many bales of good-quality baled hay were fed back with a grain supplement to aid and continue production. A grazier in the 22 in. average rainfall district of Glenmorgan, in south-eastern Maranoa commented that his baled green panic-lucerne hay was of a considerably better quality than his baled wheaten and oaten hay. Some 88 bales per acre were harvested in 1954. Yields vary from one to three tons per acre.

With the event of the buckrake and forage harvester, some dairymen have converted their surplus into silage, some 5 to 8 tons green weight per acre being ensiled.

Assisted by nitrogenous fertilizer applications, some green weights on the Darling Downs have reached a peak of 12 tons. The air-dry matter equivalent was about 4 tons/acre.

Management Vital

Once a green panic pasture germinates then the most vital contribution to its success and persistence lies largely in its management. If grazing is unavoidable in the first season, allow some 12 in. to 2 ft. of bulk to develop before lightly grazing. Most growers prefer to allow the pasture to seed as a safety measure in the first year before grazing. This is a matter of intelligent judgement gained from individual experience under the particular environment.

The system of grazing may vary according to the season, area and topography. In general, a broad system combining deferred and rotational grazing is desirous for the small and larger grazing areas. Under small paddock systems, a system of "on-and-off" grazing based on a modified "lucerne rotation" system is profitable, that is a rapid but not close grazing-off followed by 4 to 8 weeks spelling—depending on the maturing stage of the lucerne growth. During the late autumn to early spring months, this system may have to be modified for the good of the green panic component in the mixture. One system of subdivision using a common paddock to make use of only one watering point is illustrated. (See Plate 9.)

Many good stands had been damaged in the past by close early spring and late autumn grazing and mowing. Overstocking is often a danger where strip grazing is carried out, as there is a pronounced tendency to keep stock on the strips for too long.

Green panic should go into winter with some bulk growth as crown protection. The amount of bulk depends largely on the frost incidence and its ultimate use within the farm economy —for example as stand-over hay.

Green panic, lucerne and barrel medic pastures when irrigated have provided bulky, high-quality feed which has produced high milk yields on parts of the Darling Downs. In the southern parts of the Downs the oversowing in the next season of either priebe perennial prairie or wimmera rye and possibly some of the hardier subclover strains such as Clare, Yarloop or Bacchus Marsh could also be an asset. The use of an irrigated green panic-centro pasture is also worth considering for the lighter soils in frost-free areas of the State.

The results obtained by various prize-winners in the Royal National Association's Pasture Competition since 1954 indicate that well-managed green panic-lucerne pastures have the following advantages when correctly managed:

1. Practically 100 per cent. weed and soil erosion control.

2. Clean run-off water into the dams.

3. Comparatively long grazing season, particularly where the lucerne component is high.

4. Rapid response after rain providing nutritious feed. (It is common to have some 6 in. or so of succulent feed before the native pastures have "shot.")

5. Ability to maintain a high level of lucerne population for at least 7 years.

* * * * *

Stock and Slaughtering Inspectors

Examinations of candidates for admission to the Public Service as—

(*a*) Inspector, Division II. (Stock), Division of Animal Industry; or

(*b*) Inspector, Division II. (Slaughtering), Division of Animal Industry;

Department of Agriculture and Stock, will be held in Brisbane and other principal towns of the State on May 25 and 26. Vacancies are:—

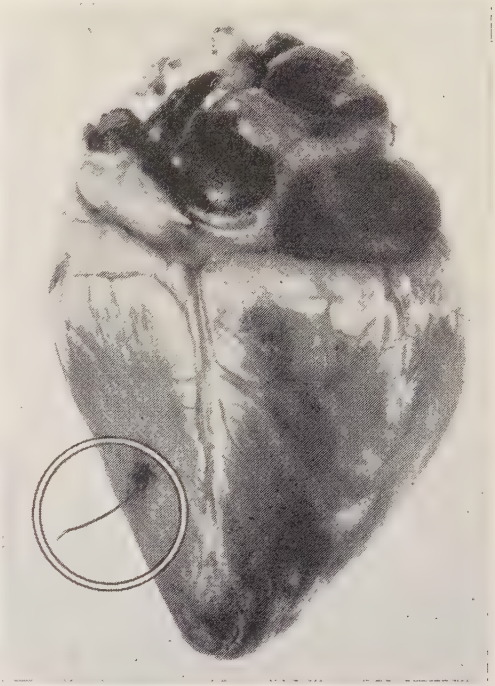
(*a*) Inspectors, Division II. (Stock) 4

(*b*) Inspector, Division II. (Slaughtering) 1

Candidates who obtain the minimum marks will subsequently be required to undergo viva voce tests and will be required to pass a medical examination.

Application forms, a copy of the regulations containing a list of the subjects in which candidates will be examined, and particulars of text-books, etc., may be obtained from the Secretary to the Public Service Commissioner, Box 59, P.O., Brisbane-North Quay.

You Can Put a Stop to This . . .



The cow this heart was taken from was sick for two days with symptoms of a digestive upset. At the end of this time she died suddenly.

You can see the wire and the wound it has made in the heart. The wire was swallowed in the feed and worked its way through from the "honeycomb" (reticulum) into the heart.

Generally wire (or bone or other foreign bodies) take much longer to work through and cause a chronic condition.

What can be done to prevent a fatality of this sort?

1. Keep the food supplement as free as possible from foreign bodies.
2. Feed phosphate if your cows chew foreign objects outside the bails.
3. If the foreign body has not penetrated too far, a veterinary surgeon can remove it by an operation. So call him early, while the cow is showing only mild symptoms.

* * *

Cattle on Sheep Stations

"Calf-Branding on a Sheep Station," the subject used on the cover of the January issue of the *Queensland Agricultural Journal*, has for many years been a yearly routine on many sheep properties.

The enterprising sheepman is often a stockman in the true sense, and can, according to the country he owns or manages, employ cattle as a further means of making the most of his property. This is particularly noticeable on those properties where there is, as the stockman puts it, "That bit of rough country," "the ridges," "the back paddocks," or in those areas where there might be "an odd dog or two."

Rapid growth following a wet season can make heavy bodies of grass, resulting in a wall of feed, which sheep will not readily penetrate. Then the use of cattle will assist in opening up, giving the following sheep a better chance to track through and benefit from this feed.

Also, there is often the block that may not be so well watered or subdivided, where good grazing is a fair way from water. Cattle lend themselves more readily to these conditions than sheep, and so the sheepman runs cattle.

These men are the mixed farmers of the grazing country, who know the value of "a few" cattle in the sheep country.

—*JOHN G. NATION,*
Adviser in Sheep and Wool.

Stock and Station

SOME graziers in the Rockhampton district have placed their bulls into the breeding herd to ensure earlier calving. They have adopted the following methods:—

1. Heifers coming into the herd to replace old breeders are mated separately from October to December.

2. Breeders which are obviously not in calf when calves were weaned are drafted off and mated at the same time as the heifers.

3. Bulls are placed with calving breeders a month earlier than what has been regarded as the normal time.

By using these methods and taking as many culls as practicable from the late calving section of the herd, earlier calving (July-September) should be effected in the shortest possible time.

Earlier calving is a sound practice when it goes hand in hand with good husbandry and management.

—*J. ARBUCKLE,*
Senior Adviser in Cattle Husbandry.

Timely Tips For April

April might be regarded as the beginning of winter. Last year "winter dysentery" swept through the State after the Exhibition. It caused scouring and loss of condition and production in our dairy herds. Treatment was of limited value.

We must be careful this year not to regard every cow that scours as having "winter dysentery". Many cows will scour from other causes such as Salmonellosis, nutritional upsets, arsenical poisoning, etc. Judge each case individually. Some will require urgent treatment.

Don't make the mistake of thinking that they're all "winter dysentery".

Changeable weather and a declining milk supply may make symptoms of pneumonia more obvious in your pigs. This extremely common disease causes panting, high temperature and unthriftiness—and a great loss of income to pig growers.

Erysipelas may also occur this month, although it may be seen at any time. It is a disease which may take many forms. Veterinary advice will lessen the loss from either of these conditions in pigs.

Swollen joints and lameness in calves may follow navel infection soon after birth. Tincture of iodine (2 per cent.) painted on the cord as early as possible after birth will prevent.

Strangles vaccine if used correctly, will make an attack of this disease less serious to a horse. If you hear that Strangles is about your district, contact your local vet. to vaccinate your horses. To be successful this vaccine must be used properly.

Tuberculosis-Free Cattle Herds. (As at 1st March, 1959.)

Aberdeen Angus.

G. H. & H. J. Crothers, "Moorenbah," Dirranbandi
A. G. Elliott, "Ooraine," Dirranbandi
W. H. C. Mayne, "Gibraltar," Texas

A.I.S.

M. E. & E. Scott, "Wattlebrae" A.I.S. Stud, Kingaroy
F. B. Sullivan, "Fermanagh," Pittsworth
D. Sullivan, "Bantry" Stud, Rossvale, *via* Pittsworth
W. Henschell, "Yarranvale," Yarranlea
Con. O'Sullivan, "Navillus" Stud, Greenmount
H. V. Littleton, "Wongelea" Stud, Hillview, Crow's Nest
J. Phillips and Sons, "Sunny View," Benair, *via* Kingaroy
Sullivan Bros., "Valera" Stud, Pittsworth
Reushle Bros., "Reubydale" Stud, Ravensbourne
A. C. and C. R. Marquardt, "Cedar Valley," Wondai
A. H. Sokoll, "Sunny Crest" Stud, Wondai
W. and A. G. Scott, "Welena" A.I.S. Stud, Blackbutt
G. Sperling, "Kooravale" Stud, Kooralgin, *via* Cooyar
C. J. Schloss, "Shady Glen," Rocky Creek, Yarraman
W. H. Thompson, "Alfa Vale," Nanango
S. R. Moore, Sunnyside, West Wooroolin
H.M. State Farm, Numinbah
Edwards Bros., "Spring Valley" A.I.S. Stud, Kingaroy
D. G. Neale, "Grovely," Greenmount
A. W. Wieland, "Milhaven" A.I.S. Stud, Milford, *via* Boonah
W. D. Davis, "Wamba" Stud, Chinchilla
Queensland Agricultural High School and College, Lawes
C. K. Roche, Freestone, Warwick
Mrs. K. Henry, Greenmount
D. B. Green, "Deloraine" Stud, Durong, Proston
E. Evans, Wootha, Maleny
T. L. and L. M. J. Cox, "Seafield Farm," Wallumbilla
J. Crookey, "Arolla" A.I.S. Stud, Fairview, Allora
M. F. Power, "Barfield," Kapaldo
A. H. Webster, "Millievale," Derrymore
W. H. Sanderson, "Sunlit Farm," Mulgildie
R. A. and N. K. Shelton, "Vuegon" A.I.S. Stud, Hivesville, *via* Murgon
R. R. Radel & Sons, "Happy Valley," Coalstoun Lakes
C. A. Heading, "Wilga Plains," Maleny
G. S. and E. Mears, "Morden," M.S. 755, Toogoolawah

Ayrshire.

L. Holmes, "Benbecula," Yarranlea
J. N. Scott, "Auchen Eden," Camp Mountain
E. Mathie and Son, "Ainslie" Ayrshire Stud, Maleny
B. Goddard, Mt. Tyson, *via* Oakey
C. E. R. Dudgeon, "Marionville" Ayrshire Stud, Landsborough
G. F. H. Zerner, "Pineville," Pie Creek, Box 5, P.O., Gympie
T. F. Dunn, Alanbank, Gleneagle

Friesian.

C. H. Naumann, "Yarrabine" Stud, Yarraman
D. J. Pender, "Camelot," Lytton road, Lindum
S. E. G. Macdonald, "Freshfields," Marburg

Guernsey.

C. D. Holmes, "Springview," Yarraman
A. B. Fletcher, Cossart Vale, Boonah
W. H. Doss, Degilbo, *via* Biggenden
A. C. Swendson, Coolabunia, Box 26, Kingaroy
C. Scott, "Coralgrae," Din Din Road, Nanango
R. J. Wissemann, "Robnea," Headington Hill, Clifton
G. L. Johnson, "Old Cannindah," Monto
A. Ruge & Sons, Woowoonga, via Biggenden
G. Miller, Armagh Guernsey Stud, Armagh, M.S. 428, Grantham
N. H. Sanderson, "Glen Valley," Monto

Jersey.

Queensland Agricultural High School and College, Lawes
J. S. McCarthy, "Glen Erin" Jersey Stud, Greenmount
J. F. Lau, "Rosallen" Jersey Stud, Goombungee
G. Harley, Hopewell, M.S. 189, Kingaroy
Toowoomba Mental Hospital, Willowburn
Farm Home for Boys, Westbrook
P. J. L. Bygrave, "The Craigan Farm," Aspley
R. J. Crawford, "Inverlaw" Jersey Stud, Inverlaw, Kingaroy
P. H. F. Gregory, "Carlton," Rosevale, *via* Rosewood
E. A. Matthews, "Yarradale," Yarraman
A. L. Semgreen, "Tecoma," Coolabunia
L. E. Meier, "Ardath" Stud, Boonah
A. M. and L. J. Noone, "Winbirra" Stud, Mt. Esk Pocket, Esk
W. S. Conochie and Sons, "Brookland" Stud, Sherwood road, Sherwood
Estate of J. A. Scott, "Kiaora," Manumbar road, Nanango
F. W. Verrall, "Coleburn," Walloon
C. Beckingham, Trouts road, Everton Park
G. H. Ralph, "Ryecombe," Ravensbourne
Mrs. I. L. M. Borchert, "Willowbank" Jersey Stud, Kingaroy
Weldon Bros., "Gleneden" Jersey Stud, Upper Yarraman
D. R. Hutton, "Bellgarth," Cunningham, *via* Warwick
J. W. Carpenter, Flagstone Creek, Helidon
H. G. Johnson, "Windsor" Jersey Stud, Beaudesert
S. A. Cramb, Bridge st., Wilsonton, *via* Toowoomba
J. A. & E. E. Smith, "Heatherlea" Jersey Stud, Chinchilla
W. C. M. Birt, "Pine Hill" Jersey Stud, Gundiah
T. Nock, Dallarnil
P. Fowler & Sons, "Northlea," Coalstoun Lakes
F. Porter, Conondale
H.M. State Farm, Palen Creek
B. T. Seymour, "Upwell" Jersey Stud, Mulgeldie
R. N. Burrows, Box 23, Wondai
W. T. Tatnell, Cedar Pocket, *via* Gympie

Poll Hereford.

W. Maller, "Boreview," Pickanjinnie
J. H. Anderson, "Inverary," Yandilla
D. R. and M. E. Hutton, "Bellgarth," Cunningham, *via* Warwick.
E. W. G. McCamley, Eulogie Park, Dululu
Wilson and McDouall, Calliope Station, Calliope

Poll Shorthorn.

W. Leonard & Sons, Welltown, Goondiwindi

Recorded Herds Averaged 345 Gal. Last Year

By S. E. PEGG, Chief Adviser, Herd Recording Section.

During the 1957-58 herd recording year, 43,726 cows from 1,217 herds completed lactations for an average production of 345 gal. of milk and 143 lb. of butterfat.

As drought conditions prevailed for a considerable portion of the season this yield was higher than expected. For comparison the average butterfat production per cow in 1955-56, a normal year, was 155 lb. fat. In the same years, total butter production for the State dropped from 48,189 tons in 1955-56 to 32,280 tons in 1957-58. Thus the yield of recorded cows dropped by only 8 per cent., whereas the total butterfat production for the whole of the State was 33 per cent. lower.

From this it can be deduced that members of herd recording groups were in a better position to withstand the ravages of drought than other dairymen. It does seem that herd recording has created an awareness of the necessity to provide against lean periods.

Owing to the dry season, a number of farmers withdrew their herds from recording groups. The number of groups recorded fell from 81 to 78 during the year. In a number of cases, when a recorder resigned he was not replaced but the members of the group were serviced by the recorders of adjacent groups.

The total completed lactations and average production per cow for each year since group recording was instituted are given in Table 1.

TABLE 1.

Year.	Herds.	Lactations.	Average Production per Cow.		
			Milk (lb.).	Test (%).	Butterfat (lb.).
1948–49	507	17,216	3,289	4·3	144
1949–50	715	22,392	3,523	4·3	152
1950–51	814	26,798	3,312	4·4	146
1951–52*	818	23,123	2,657	4·2	112
1952–53	1,073	34,304	3,467	4·3	150
1953–54	1,202	41,378	3,143	4·3	134
1954–55	1,266	45,734	3,486	4·3	150
1955–56	1,412	54,352	3,563	4·3	155
1956–57*	1,466	59,711	3,508	4·2	149
1957–58*	1,217	43,726	3,449	4·1	143

* Drought year.

TABLE 2.

Age Group.	Cows.	Average Production per Lactation.		
		Milk (lb.).	Test (%).	Butterfat (lb.).
2-year-old	6,278	3,006	4·2	127
3-year-old	4,980	3,247	4·2	137
4-year-old	4,441	3,495	4·2	147
Mature	18,955	3,749	4·1	153
Unknown Age	9,072	3,219	4·1	133
Total	43,726	3,449	4·1	143

Average Production of Age Groups

Table 2 shows the number of cows, according to age groups, which completed recorded lactation periods of 300 days or less, and their average production.

Once again it is necessary to draw attention to the large number of cows of unknown ages. Some 9,072 cows representing 20.7 per cent. of the total cows which completed recorded lactations were of unknown age. This compares unfavourably with the 19.2 per cent. of last year and 14.8 per cent. in 1955-56. In herds which have been recorded for a few years, there should be no cows of unknown age. If this information has been recorded on the shed sheets it will be readily available for the recorder, who can enter it on the record sheet when the cow enters the milking herd each season.

Average Length of Lactation

A pleasing feature of this year's results was the average length of lactation. It was 247 days, the longest ever achieved. For some years the short lactation period of dairy cows has caused much concern to the dairying industry. It is to be hoped that the period will continue to increase from year to year. The average length of lactation each year since 1948-59 is given in Table 3.

TABLE 3.

Year.	Length of Lactation (Days).
1948–49	220
1949–50	223
1950–51	203
1951–52	209
1952–53	210
1953–54	211
1954–55	224
1955–56	229
1956–57	230
1957–58	247

The average length of lactation for each of the areas in the State is given in Table 4.

TABLE 4.

District.	Length of Lactation (Days).
Atherton Tableland ..	251
Mackay	257
South-Eastern Queensland	254
Eastern Downs	239
Western Downs	229
Central Burnett	260
Dawson–Callide	238
South Burnett	241
Port Curtis	253
Upper Burnett	254

Average Production in Each Group

The average production for each Herd Recording Group is shown in Table 5. The Groups are listed according to districts and the average production of each district is shown also.

TABLE 5.

District/Group.	Herds.	Cows.	Average Length Lact.	Average Milk (lb.).	Average Test (%).	Average Butterfat (lb.). 1957–58.	Average Butterfat (lb.). 1956–57.
Atherton Tableland . .	*72*	*2,725*	*251*	*4,089*	*4·1*	*168·3*	*173·2*
Malanda No. 1 . .	14	529	246	4,924	4·1	199·8	204·9
Malanda No. 2 . .	19	685	259	3,900	3·8	149·8	151·7
Malanda No. 3 . .	18	792	255	4,241	4·1	174·5	164·0
Millaa Millaa . .	21	719	244	3,487	4·5	155·8	174·5
Mackay	*16*	*726*	*257*	*3,162*	*4·4*	*137·9*	*145·8*
Port Curtis	*60*	*1,793*	*253*	*2,667*	*4·5*	*119·3*	*123·2*
Mount Larcom No. 1	14	406	240	2,384	4·2	100·5	123·6
Mount Larcom No. 2	11	250	253	1,951	4·5	88·0	104·8
Rockhampton . .	14	511	253	2,939	4·7	136·7	130·5
Rosedale	13	458	258	2,891	4·5	130·1	134·1
Wallaville	8	168	268	2,982	4·3	129·3	121·3
Dawson–Callide . .	*57*	*2,628*	*238*	*2,760*	*4·3*	*117·4*	*132·0*
Biloela No. 1 . .	16	950	245	2,790	4·3	118·6	142·8
Biloela No. 2 . .	13	504	256	3,161	4·4	138·9	135·6
Biloela No. 3 . .	14	567	223	2,611	4·3	112·3	110·4
Wowan	14	607	230	2,552	4·0	102·5	128·9
Upper Burnett . .	*36*	*1,416*	*254*	*2,852*	*4·4*	*124·5*	*141·6*
Monto No. 1 . .	17	612	253	2,772	4·3	118·2	148·6
Monto No. 2 . .	19	804	255	2,912	4·4	129·3	134·0
Central Burnett . .	*40*	*1,478*	*260*	*3,355*	*4·2*	*141·1*	*139·3*
Biggenden	15	597	275	3,769	4·3	162·0	154·6
Mundubbera No. 1	6	300	255	2,969	4·2	124·0	114·6
Mundubbera No. 2	9	293	243	3,062	4·2	127·5	153·9
Mundubbera No. 3	10	288	253	3,200	4·0	129·6	136·4
South Burnett . .	*213*	*8,136*	*241*	*3,453*	*4·0*	*137·3*	*148·5*
Durong	9	728	240	4,247	3·7	156·4	176·7
Kilkivan	15	535	258	2,565	4·3	109·6	114·2
Kingaroy	22	756	231	3,773	3·8	141·5	162·2
Kumbia–Ironpot . .	16	954	238	3,861	3·6	140·7	131·1
Murgon	16	749	249	3,371	4·1	137·6	142·3
Nanango No. 1 . .	18	703	245	3,165	4·1	130·0	148·4
Nanango No. 2 . .	18	710	242	3,726	4·0	147·4	166·0
Nanango No. 3 . .	18	586	247	4,054	3·9	159·7	140·2
Proston No. 1 . .	11	440	235	3,158	4·3	135·4	161·9
Proston No. 2 . .	15	605	240	2,847	4·4	124·9	124·3
Tansey	20	473	242	2,676	4·3	116·3	133·6
Wondai	12	365	251	3,525	4·0	141·9	159·7
Wooroolin–Tingoora	23	532	221	3,154	4·1	129·3	143·0
South-East Queensland	*452*	*16,500*	*254*	*3,314*	*4·2*	*138·8*	*139·7*
Beaudesert No. 1 . .	10	576	246	4,138	3·7	153·9	150·4
Beaudesert No. 2 . .	13	518	235	2,979	4·2	125·4	132·7
Beechmont–Currumbin . .	19	753	248	3,156	4·2	132·8	123·7
Beenleigh	19	643	250	3,367	3·8	129·0	123·3
Boonah	20	682	253	4,141	4·0	163·9	178·2
Brisbane No. 1 . .	22	608	244	4,039	3·8	153·5	179·3
Brisbane No. 2 . .	20	854	260	3,568	3·8	134·9	130·8
Cedar Pocket . .	12	300	261	3,101	4·5	140·3	127·4
Cooroy	15	699	264	3,041	4·5	136·0	148·4
Esk No. 1	15	630	255	4,035	4·2	169·2	146·6
Esk No. 3	12	402	252	3,803	4·3	161·9	142·1
Gatton	16	441	233	3,276	3·8	124·5	150·9

TABLE 5—*continued.*

District/Group.	Herds.	Cows.	Average Length Lact.	Average Milk (lb.).	Average Test (%).	Average Butterfat (lb.). 1957–58.	Average Butterfat (lb.). 1956–57.
S.-E. Q'ld.—cont.							
Gympie No. 1	14	529	246	2,631	4·4	116·3	124·2
Gympie No. 2	15	852	268	2,879	4·9	140·5	139·0
Ipswich No. 1	14	402	254	3,157	4·1	130·6	138·6
Ipswich No. 2	19	522	248	3,400	4·1	138·2	141·0
Ipswich No. 3	14	508	251	4,053	3·8	154·3	129·2
Kenilworth	17	641	269	3,636	4·2	153·3	161·5
Kilcoy	22	916	246	2,948	4·4	129·2	118·5
Laidley	8	129	232	2,342	4·5	104·8	142·4
Lowood	18	433	244	3,292	4·2	137·6	151·8
Maleny No. 1	18	577	247	2,790	4·6	127·4	143·1
Maleny No. 2	15	459	264	2,981	4·7	138·9	158·3
Maleny No. 3	9	432	270	3,657	4·4	159·2	. .
Maryborough	10	258	253	2,685	4·3	115·9	135·5
Merrimac–Mudgeeraba	15	845	253	3,619	4·0	144·7	139·7
Mooloolah–Kureelpa	20	667	260	2,708	4·3	116·9	137·4
Pomona	15	544	257	2,924	4·6	135·5	133·6
Wolvi	16	680	261	2,800	4·5	125·2	118·3
Eastern Downs	*193*	*5,539*	*239*	*4,261*	*4·1*	*173·0*	*188·8*
Allora No. 1	16	446	219	3,936	4·1	160·9	194·0
Allora No. 2	17	329	237	4,923	3·9	194·2	. .
Crow's Nest	23	555	248	3,297	4·2	139·2	144·5
Goombungee	16	549	237	3,980	4·1	164·6	214·5
Oakey	19	832	247	4,179	4·1	170·2	180·6
Pittsworth No. 1	20	677	244	4,845	4·0	195·2	224·8
Pittsworth No. 2	6	185	249	4,385	4·4	192·5	230·5
Toowoomba No. 1	21	582	239	4,608	4·2	191·4	225·0
Toowoomba No. 2	24	632	241	4,262	3·7	159·0	172·6
Warwick No. 1	20	548	228	4,236	4·1	174·1	180·5
Warwick No. 2	11	204	236	4,653	4·1	189·2	188·5
Western Downs	*78*	*2,785*	*229*	*3,580*	*4·0*	*143·6*	*166·4*
Chinchilla No. 1	15	570	231	3,610	3·9	142·2	165·7
Chinchilla No. 2	14	373	228	3,754	4·1	154·3	180·3
Dalby No. 1	19	685	224	3,673	4·1	149·5	187·1
Jandowae	17	740	232	3,669	4·0	145·5	154·7
Miles	13	417	229	3,125	3·9	122·5	148·7
Queensland Figures	*1,217*	*43,726*	*247*	*3,449*	*4·1*	*142·5*	*148·9*

Butterfat Ranges of Cows

The number of cows whose yields came within the various butterfat ranges is shown in Table 6.

TABLE 6.

Range of Butterfat.	Number of Cows.	Percentage of Cows.
Under 100 lb.	10,551	24·1
100–149 lb.	15,423	35·3
150–199 lb.	10,975	25·1
200–249 lb.	4,543	10·4
250–299 lb.	1,513	3·5
300–249 lb.	493	1·1
350–399 lb.	163	0·4
400 lb. and over	65	0·1

The percentage of cows which produced less than 100 lb. fat for a completed lactation increased from 22.5 per cent. in 1956-57 to 24.1 per cent. in 1957-58. This means that one cow out of every four produced less than 100 lb. fat.

Even allowing for the adverse seasonal conditions this is far too many. More attention must be given to these cows as they cannot be profitable to their owners. They should be culled to make room for more profitable animals or else fed adequately to ensure greater production.

TABLE 8.

Herd Owner.	Group.	Breed.	Number of Cows.	Average Production.			
				Milk (lb.).	Test (%).	Butterfat (lb.).	Length of Lactation (Days).
		11–20 Cows.					
L. G. Weier	Allora No. 1	A.I.S.	19	9,345	3·6	340	273
K. M. and R. Laws	Malanda No. 1	A.I.S.	16	7,841	4·0	317	279
N. Sippel	Lowood	Jersey	15	6,246	4·6	290	278
		21 50 Cows.					
A. Ruge and Sons	Biggenden	Guernsey	50	7,183	4·4	319	289
E. and V. Shield	Brisbane No. 1	A.I.S.	32	7,800	3·9	301	285
J. H. Fletcher	Warwick No. 1	A.I.S.	34	7,150	4·1	291	277
		51–100 Cows.					
J. McInnes	Durong	A.I.S.	70	8,127	3·8	307	292
K. McIntyre	Pittsworth No. 1	A.I.S.	72	7,348	4·1	302	265
P. J. Donaghy and Sons	Malanda No. 1	A.I.S.	57	6,659	3·9	262	261
		101 and Over.					
A. R. Reidy	Kumbia–Ironpot	A.I.S.	118	5,672	3·7	208	268
H. Seng No. 1	Durong	Mixed	104	4,722	3·6	172	241
P. E. H. O'Brien	Jandowae	Jersey	156	3,478	4·7	163	244
R. L. Harrison	Beaudesert No. 1	A.I.S.	118	4,509	3·6	163	247

Herds in Various Production Ranges

The numbers of herds in various butterfat production ranges are given in Table 7.

TABLE 7.

Butterfat Production Range.	Number of Herds.	Percentage of Herds.
Under 100 lb. . .	222	18·2
100–149 lb.	566	46·5
150–199 lb.	297	24·4
200–249 lb.	102	8·4
250–299 lb.	23	1·9
Over 300 lb.	7	0·6

These results indicate that 65 per cent. or two out of every three herds, averaged less than 150 lb. butterfat. The present position of the industry demands economic production. This cannot be obtained unless the output per cow is increased.

Highest Producing Herds

The highest producing herds together with their production results are listed in Table 8. The herds are listed in sections according to the number of cows which completed lactations.

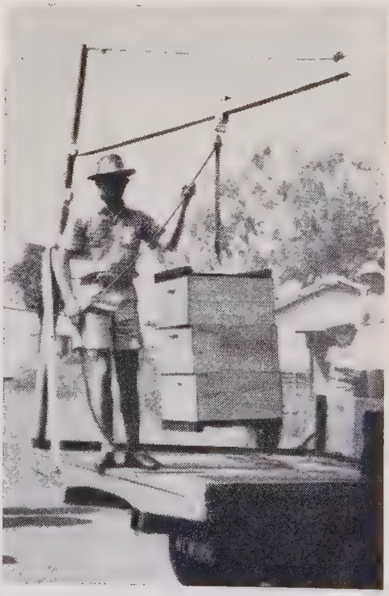
These results, obtained despite the drought, tell the story of careful farm planning and husbandry.

The proof of the value of continuous herd recording can be found on the numerous farms where progressive increases in annual production have been obtained by recording members. An excellent example this season was provided by the herd with the overall highest average production per cow. The 19 cows in this herd, which belongs to Mr. L. G. Weir, Allora, averaged 9,345 lb. milk and 340 lb. fat. When first recorded in 1952-53 the average production of the then 16-cow herd was 6,220 lb. milk and 243 lb. fat. During this period the length of lactation has increased from 231 days in 1952-53 to 273 days this year.

This result and the overall manner in which recorded herds maintained their production in spite of the adverse drought conditions in 1957-58 season indicates that regular recording of cows provides a valuable yardstick on which producers can assess the success of their farm management and husbandry practices.

◆

Field Day For Beekeepers



This home-built, boom-type, line loader was demonstrated by Mr. R. KEILLOR, of Banyo, at the Beekeepers' Field Day (see page 140).

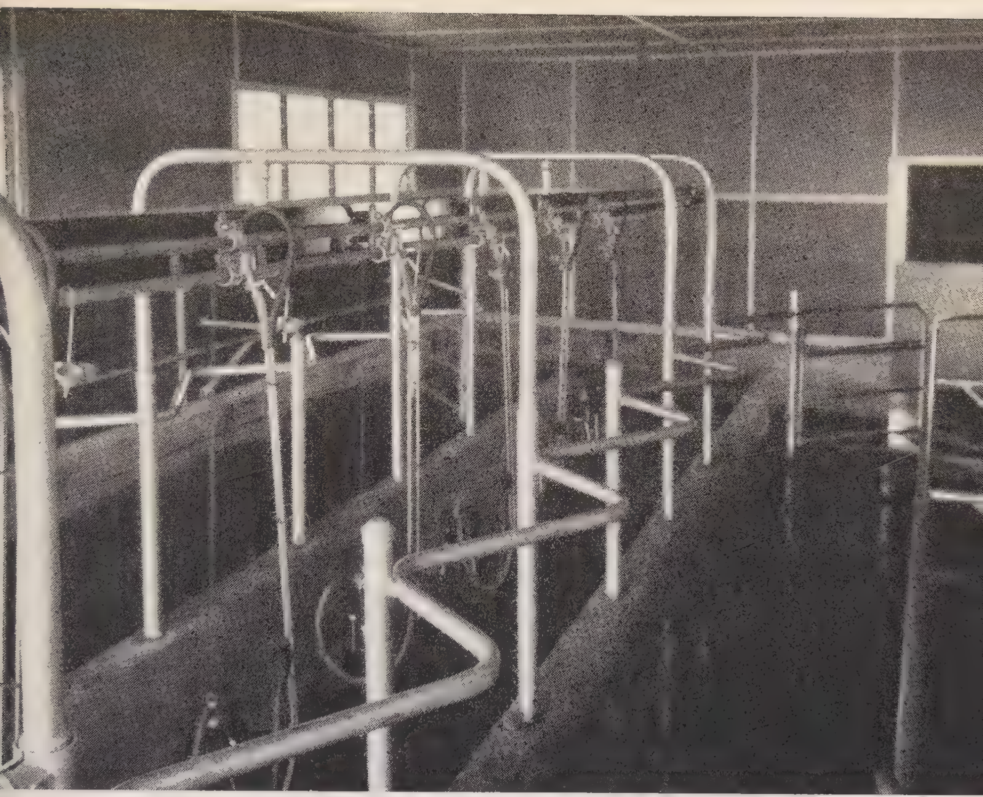


Plate 1.—A View of the Elevated Herringbone Milking She

This Shed Milks Cows Quicker . . . With Less Work

By J. D. ELRINGTON, Senior Adviser (Machinery).

If the object of building a new milking shed is to milk cows quicker and with less labour, then farmers must be interested in the "elevated herringbone" milking shed. Trials of shed designs to discover milking times have been made in New Zealand. These show that up to 60 per cent. more cows can be milked by each man each hour in one-man herringbone sheds than in other one-man sheds.

A few milking times have been taken in some of the herringbone sheds in Queensland, and these times all favour this design. The operator is not working so hard as formerly, either. The following table shows the comparative milking times taken on six occasions in sheds of the walk through and herringbone styles.

These times were taken from when the cups were placed on the first cow until they were taken off the last one.

Shed Design.	Milking Units.	Milkers.	Herd Size. (Cows).	Average No. of Cows per Man per Hour.	Average No. of Cows per Unit per Hour.	Additional Duties.
Farm A— Walk through . .	6	2	87	35	11·6	No feeding No hand stripping
Farm B— Herringbone . .	7	2	112	45	11·5	. .
Farm C— . . Walk through . .	4 (1 double 2 single)	2	63	25	12·6	Meal fed in bails
,,	,,	2	64	21	10·7	,,
Farm C— Herringbone . .	6	2	56	43	14·3	Meal fed in bails
,,	6	2	56	40	13·7	,,

There is no significant difference in the average number of cows milked by each set of cups, but there is a vast difference in favour of the herringbone bail in the average number of cows milked each hour by each man. While two men were necessary in the walk-through sheds, one man could have comfortably supervised milking in the herringbone sheds. In these latter sheds it was found that the two milkers were waiting on the machine for every race of cows to be milked. The job was much easier, because there were less visits to the cowyard, and there was no bending under each cow three or four times.

Back chains are eliminated. Leg-ropes or leg-hooks and chains can be used but, after installation, frequently lie idle. When used, the leg is drawn back towards the post which supports the zig-zag rail.

Very seldom does the herd divide evenly into the correct number of cows to completely fill the last race. A rail is kept in the milker's alley to slide across the cow platform at the side of the last cow, to hold the last few cows in position.

HERRINGBONE CONSTRUCTION

This new type of milking shed is only different from the combined shed (walk-through type) in the milking section. The milk room, wash-up area, and engine room air space are the same, and the whole building is subject to the same requirements of the Dairy Produce Acts.

The floor of the whole building is on three levels and the drainage is toward the cowyard. The milker's alley and cowyard are on the same level. The floor of the milk room, air space and cow exit passage is 15 in. higher than the milker's alley, and the cow platforms are 15 in. higher still, that is, 30 in. higher than the milker's alley and cowyard.

The cows walk up a ramp rising 30 in. from the cowyard. This ramp can be fairly long, to reduce the grade. If the concrete is roughened, the cows have no difficulty in walking up this ramp.

They stand diagonally across the cow platforms, heads to the outside wall, and heads and bodies inclined towards the milk room. The rail which is bent in a zig-zag fashion assists them to stand in the correct position. The milker works in the alleyway, and is not required to do any bending. He walks only 3 ft. (2 short paces) to move from one cow to the next and the teatcups are suspended within easy reach.

Cows find it easier to walk up a hill than down it. As the exit path is 15 in. above the milker's alley floor, the cows only have to be brought down 15 in. from the cow platforms to the exit path. The down ramp can be fairly short, and is still not very steep. It should be grooved across the ramp with deep toeholds to minimise slipping. If cows still show a tendency to slip, a bag can be thrown on these ramps to afford a better grip but rough concrete and ½ in. deep grooves are sufficient to arrest slipping.

Alternative Designs

There are alternative designs to the one shown in the Departmental plan. Sheds built to these alternative designs have been carefully examined, and the Departmental plan was drawn after this examination. Consideration of pleasant working conditions, drainage and ease of cow entry and exit influenced the adoption of the design chosen and described here. Construction offers no difficulties to any qualified builder, and farmers who have a sound knowledge of carpentry should be able to erect the structure themselves.

An architect's ground and elevation plan together with a complete list of the materials and an order sheet can be supplied to intending builders. This material is available in every Departmental office where a Dairy Officer is stationed.

SITE AND SIZE OF SHED

Selection of the site, provision of water supplies, and design requirements are already adequately covered in the Division of Dairying Pamphlet No. 37, "Dairy Farm Premises." Minor variations dictated by the changed design are discussed here.

(a) Site

As excavations are necessary, the slope of a site can be used to advantage. As previously explained, the plan shows that the floor of the milk room, the engine room, and the end of the milking section nearest the milk room is 15 in. higher than the milker's alley and the cowyard. The floor of the milker's alley is at cowyard level. A site with a gentle slope from milk room to cow yard is advantageous.

(b) Orientation of the Building

The plan shows the ideal direction of the building for the majority of dairying districts in Queensland, that is open side to the north east, closed and protected side to the south west. This arrangement can be varied to suit local climatic conditions and the site, although it is advantageous to have as much sunlight as possible shining into the bails.

(c) Size of the Herd and the Herringbone Shed

A frequent question is, "How small a herd can be economically milked in a herringbone shed?" and a statement often heard is, "The herringbone shed is only suitable for large herds."

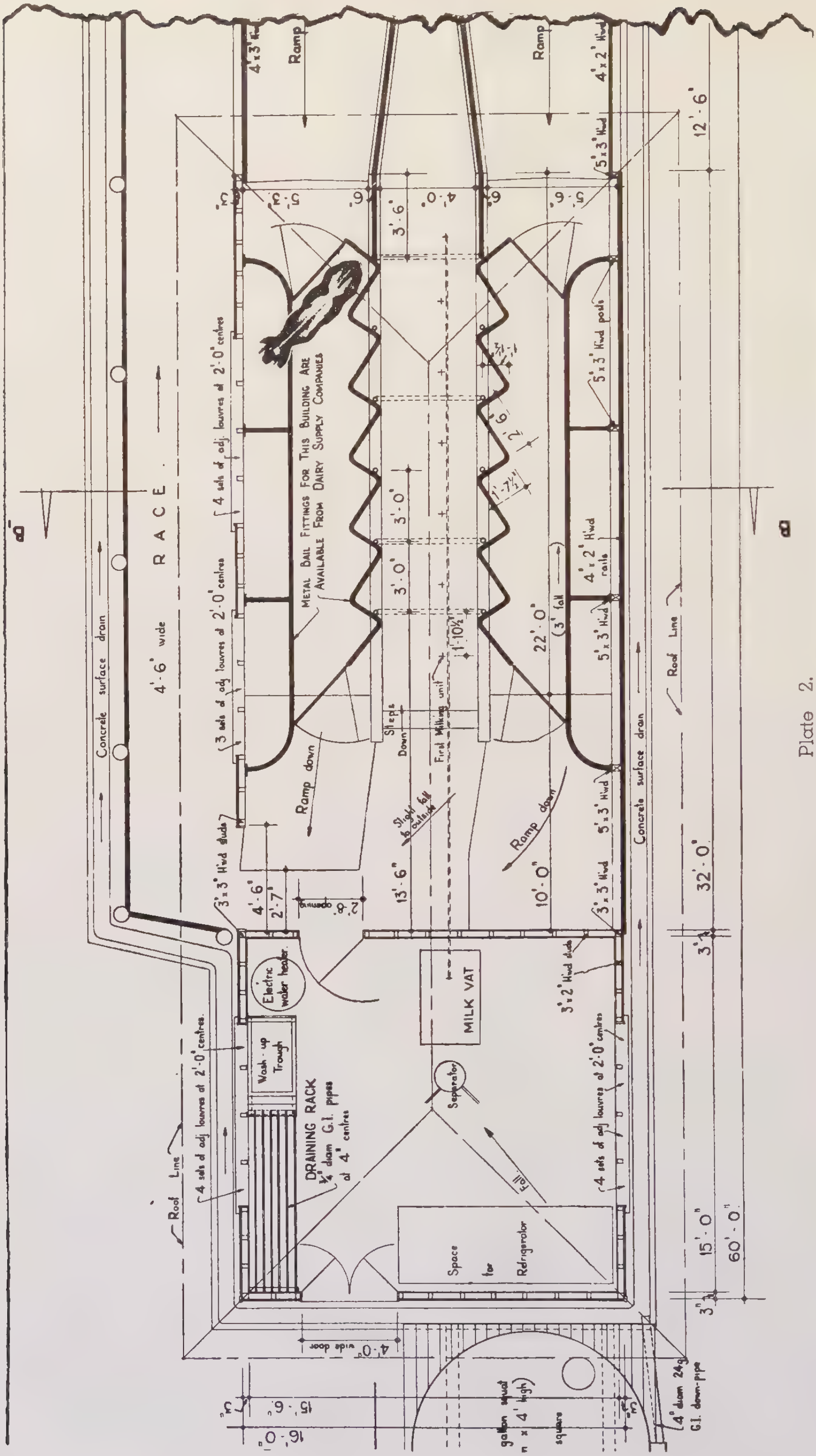

B
RACE
4'·6" wide
Concrete surface drain
Ramp
4' x 3' H'wd
4' x 2' H'wd
5' x 3' H'wd
12'·6"
4 sets of adj. louvres at 2'·0" centres
3 sets of adj. louvres at 2'·0" centres
Metal Bail Fittings For This Building Are Available From Dairy Supply Companies
3'·6"
4'·0"
3'·0"
3'·0"
2'·6"
1'·7½"
1'·10½"
22'·0"
(3" fall)
4' x 2' H'wd rails
5' x 3' H'wd posts
Steps Down
First Milking unit
Slight fall to outside
Ramp down
Ramp down
13'·6"
10'·0"
4'·6"
2'·7"
2'·8" opening
3' x 3' H'wd studs
3' x 2' H'wd studs
32'·0"
3"
Electric water heater
MILK VAT
Wash-up Trough
Separator
DRAINING RACK
¾" diam G.I. pipes at 4" centres
Fall
Space for Refrigerator
4 sets of adj louvres at 2'·0" centres
Roof Line
15'·0"
60'·0"
4'·0" wide door
15'·6"
16'·0"
gallon squat
x 4' high
square
4" diam 24g G.I. down-pipe

Plate 2.

Plan of the Elevated Herringbone Milking Shed. This is a reduced section of the full Departmental plan.

In the herringbone shed, one man is required for six sets of cups, and each set of cups can milk 10 to 12 cows an hour. The man is working at a reasonable pace because this shed reduces the effort required to milk the cows. With the walk-through design, one milker can only supervise up to four sets of cups satisfactorily.

There is no doubt that in large herds a reduction in milking time, labour and effort is obtained ("labour" refers to the number of persons required). With the herringbone design, one man can milk about 70 cows an hour. An examination of the number of cows per man per hour in the sheds listed in the table would suggest this number is high, but as explained earlier the two milkers in sheds B and C were not fully occupied during milking.

The herringbone design is also recommended for small herds, even when no more than three sets of cups are required, because of the reduced effort necessary at every milking. The Departmental plan can easily be modified by adding to or subtracting from the length of the building in the plan 3 ft. for every set of cups more or less than the six shown.

COMPARATIVE COSTS

A 6-unit herringbone bail building (holding two rows of six cows, air space and 15 ft. 6 in. x 15 ft. (inside) milk room requires 53 ft. 9 in. x 16 ft. overall dimensions, plus the ramps from cowyard to the milking platforms (860 sq. ft.).

A 6-unit walk-through bail building for a similar size herd requires 63 ft. 2 in. x 15 ft. overall dimensions, the milk room being 14 ft. 4 in. x 14 ft. 3 in. inside (947½ sq. ft.).

The difference in costs in these two buildings built to the same standards would not be very great, because of the more complicated floor structure, but cheaper bail structure, of the herringbone bail.

There is little difference in overall floor area between the two designs with herds of a smaller size. In a three-unit walk-through shed, the milking section is 23 ft. x 15 ft., while in the herringbone shed of similar capacity it is 23 ft. x 16 ft. With the herringbone design, however, the ramps, the formwork and the filling of the platforms are extra and require the expenditure of additional capital. This additional cost is considered to be justified by the reduction of effort during the many years the shed will be in use.

FEEDING

Many producers find it necessary to feed cows to maintain milk production, particularly in the low production winter months. However, a full ration cannot be fed in the bails because the cow does not have time to eat it. At a milking rate of 12 cows an hour per set of cups, each cow is actually in feeding position for only about 7½ minutes. If concentrates are to be fed during milking, one of two alternative constructions can be arranged in sheds of this design. The first one is to increase the overall width of the milking section by 6 ft. to allow a 3 ft. feeding passage between the heads of the cows and the outside wall, on each side. This arrangement adds considerably to the overall cost of the building. Where feed troughs of this type are installed, two people are necessary in a 6-unit shed, as the feeds must be put into the troughs after the cows have been bailed. If the feeds are put out prior to bailing, the first cow up the ramp will probable stop at the first feed trough.

The other alternative is to attach the feed troughs to the wall in the correct position so that the cows can drop their heads to them comfortably. The trough nearest the milk room would need to be slightly beyond the restraining gate, and the troughs then would be spaced at 3 ft. (centre to centre) distances. Above each trough there could be placed a feed hopper of about 4 gal. capacity, with a chute leading to the trough, the feed being controlled by a slide in the chute.

All the slides are attached to one long ½ in. round mild steel rod by means of a curved piece of round mild steel rod. The long rod running the length of the cow platform is attached to a lever, with sufficient travel to open and close the chutes, and long enough for easy and convenient operation. The lever can be at either end of the cow platforms.

Before milking, the hoppers are filled. After the cows are bailed, one pull on the lever will release feed into all the troughs, and when enough feed has fallen, the lever is pushed to close all the slides.

A 4 gal. capacity hopper should be sufficient for several milkings. With six sets of cups and 60 cows, there are only five rations taken from each hopper each milking. This is a much cheaper and faster method of feeding concentrates in the bails.

The practice of feeding in the milking bails means special precautions should be observed to protect milk quality. Because of bacteria and parasites associated with feed, every endeavour should be made to feed in a separate building other than the milking shed.

The herringbone bail makes it possible for a dairyman to milk a maximum number of cows in the shortest possible time, and still give his cows some individual attention. By bringing in a number of cows on each trip to the yard, standing them on an elevated platform so that the continual bending is eliminated, and arranging the cows so that the udders are only 3 ft. (one pace) apart, the effort required to do the milking is reduced considerably. In addition this arrangement permits a better inspection of each cow.

Several of these sheds are in operation in this State, and farmers thinking of building new sheds should contact their fellow farmers if any doubts exist about the suitability of the herringbone type milking bail for speedy and efficient milking.

* * *

Pasture For Charters Towers

"V.R.," of Charters Towers has inquired if Rhodes grass and green panic grass would be suitable for the sandy country in that district.

Answer: The conditions prevailing in the Charters Towers district would probably favour the sowing of buffel grass rather than Rhodes grass or green panic grass. When conditions are favourable the latter two grasses could out-produce buffel grass in the initial stages but they are not so resistant to hard conditions as buffel.

It may be worthwhile planting Townsville lucerne in the area. The seed should be inoculated before planting. Inoculum is available free of charge from the Department and is supplied with full instructions for its use. It should be ordered about a week or a fortnight before the date planned for sowing.

The best time to sow these plants is during the early wet season. Planting after the first storm rains often results in seedlings being killed off during the hot dry spells that frequently follow.

How much milk do beef cows give?

By J. ARBUCKLE,
Senior Adviser in Cattle Husbandry.

Growth-rate studies of cattle grazing on native pastures in different parts of Queensland have revealed a typical pattern. Daily gains are usually highest following heavy storm rains in late spring or early summer. By April-May, gains have ceased and a weight loss occurs during the winter months. The time when weight gain commences after winter depends largely on available soil moisture and varies from September to November in most seasons. The lack of feed, either in quality or quantity, is responsible for weight losses.

If we are to turn off the good quality, lightweight beef which commands the best prices, it is most desirable that animals make continual weight gains. At the same time this objective has to be achieved in an economical manner. The first step is to make the best use of the feeds at hand. These are the native pastures and the milk supply from the beef cow mother.

We now have a general knowledge of the beef-producing potential and characteristics of native pastures but have very few facts concerning milk production of the beef cow. How much milk does she produce? Can the calf make best use of it? What is the influence of subsequent pregnancy on milk production? One could go on asking questions. But, during the last two years, work has been done in finding answers. Results to date are interesting and reveal the need for further investigation.

Where the Work Was Done.

In order to record how much milk a beef cow produces, an investigation was commenced on Mr. J. Black's property, "Hillview," Glen Geddes, 40 miles north of Rockhampton, in November, 1956. The second year's work began in September, 1957, and is reported to July, 1958.

The milk production was measured over 24 hours at about monthly intervals by the following method:

Cows and calves were yarded at 4 p.m. The calves were allowed to suckle to make sure all milk was extracted from the udder. All calves were then locked up for the night and the cows were weighed and returned to their paddock. Early next morning, cows were mustered, calves weighed, allowed to suckle and then re-weighed. By deducting the before-suckling weight from the after-suckling weight, the amount of milk taken in by the calf was calculated.

This process was repeated in the afternoon to obtain the milk consumed for the 24 hours.

In the 1957-58 season the opportunity was taken to record the performance of 2 and 3 years old heifers which calved in September, together

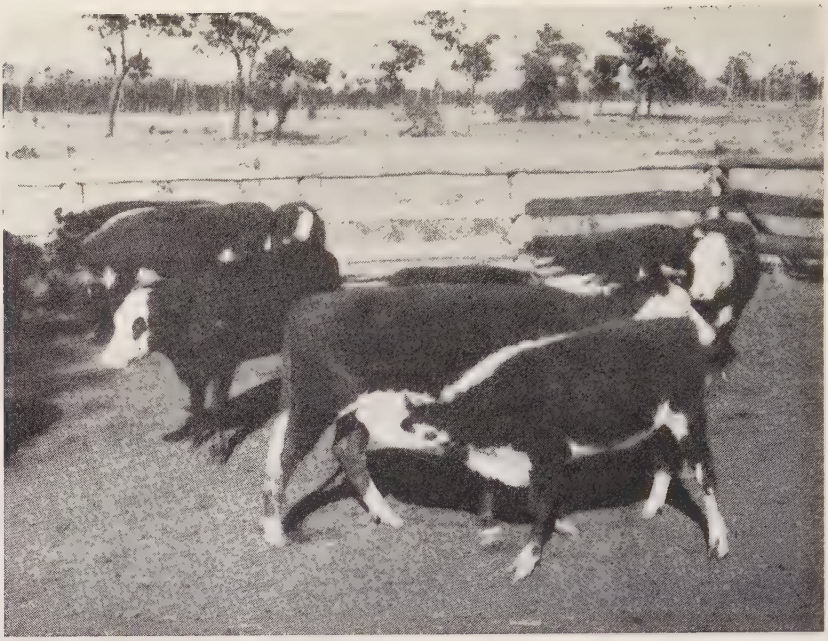


Plate 1.

Calves Suckle Readily After Being Held in the Yard Overnight.

with mature cows calving in November. These groups are referred to as "Early Calved" and "Late Calved" respectively.

Soil and Vegetation.

The soils and vegetation on "Hillview" are typical of large areas of central coastal Queensland. The soils could be described as grey, powdery, clay podsols with an original tree cover of iron bark.

The natural pastures found in the paddock include Bunch or Black spear grass (*Heteropogon contortus*) with several species of Blue grasses (*Dicanthium* and *Bothrichloa* spp.) and white spear (*Aristida* spp.). The grasses are deficient in available phosphate after seeding in April-May.

About half the paddock was ringbarked. The stocking rate was one cow to 10 acres.

Seasonal Conditions.

Rainfall in points at "Hillview" since July, 1956, was:

——	1956.	1957.	1958.
January	..	200	506
February	..	411	993
March	..	..	198
April	..	..	526
May	..	..	..
June	..	30	776
July	213	364	103
August	80	200	..
September	90	..	..
October	..	500	..
November	199	105	..
December	970	234	..
Totals	1,552	2,044	3,102

The "wet" season for 1956-57 was very light, with high day and night temperatures. These high temperatures extended into late March.

By June, drought conditions were being experienced.

Unexpected rain in July and August relieved the position somewhat and the 500 points in October ensured a good spring.

Rainfall for 1957 was about half the normal rainfall for the year.

With 3,079 points to the end of September, seasonal conditions for 1958 could be considered normal. However, the total of 776 points in June was unseasonal and combined with a mild winter, tended to give a better year than average.

It is too early to draw definite conclusions. Seasonal conditions were different in the two years and the state of pregnancy of the groups has also differed between the years. Both these factors influence milk production. However, it is desirable to point to trends observed to date.

In all cases there has been a steep fall in milk production after April. The decline has been at about the same rate for cows calving in either September or November. Decline in pasture quality and advancing lactation would seem to be the reasons for this drop.

Time of Calving.

Cows which calved in November of each year produced over a gallon of milk daily to the end of January. It should be noted that the cow is credited only with the quantity of milk taken by the calf. During early lactation when the calf is comparatively small, it is quite likely that the cow produces more milk than the calf can drink. Under conditions of good feed, the cow adjusts her top production to the quantity taken by the calf. As lactation advances, milk production drops despite the fact that the requirements of the calf increase.

The heifers which calved in September, 1957, reached peak milk production in January, which was the fourth month of lactation. Although the feed supply may be only fair, animals which calve in good condition in September will produce at a medium level, as shown by the 1957-58 early-calved group. This is because the cow is able to convert some of her accumulated bodyweight (or "condition") into milk production. There is a natural tendency to do this.

Young, green grass is a suitable feed for milk production. Its influence is clearly shown by the rise in production by January. September calvers tend to have a more uniform level of production for the first six months, even though there is no high flush or peak. November calvers tend to combine the physiological flush with the pasture flush and probably are capable of producing more milk than the young calf can handle. As pasture quality declines, the late calvers drop in milk production in a similar manner to the early calvers.

It would appear clearly that cows which are not in calf again will milk for a much longer period than their pregnant mates. In the 1956-57 group the only two cows still milking in September, 1957, were both non-pregnant. The higher winter milk production of the 1957-58 group can be attributed to better-than-average pastoral conditions and the fact that 14 of the 23 cows are not in calf again.

Milk Requirements of Calves.

For the first three weeks of its life, the calf is entirely dependent on milk. The quantity required daily varies from 10-12½ per cent of the body weight of the calf. Thus a 70 lb. calf (about the average weight of a normal beef calf) would require from 7 to 9 lb. of milk daily. As the calf grows it can drink and use correspondingly greater quantities of milk if available.

At three weeks to one month of age the calf will nibble at pasture. Since its appetite and capacity to handle bulky feed are limited, the pasture

The Results Obtained

The results are set out in table form:

TABLE 1.

1956–57 SEASON.

(Average of 19 head of cows plus their calves.)

	28–11–56.	25–1–57.	4–3–57.	17–4–57.	17–5–57.	10–7–57.	10–9–57.
(*a*) Milk Production							
Daily yield (lb.)	12·2	10·05	6·84	4·2	2·6 (2 dry)	0·78 (4 dry)	(17 dry)

Estimated average total milk production = 129 gal. (Range 72–186 gal.).

(*b*) Calf Weights (lb.) (11 females, 8 males)	103 (av. age 15 days)	203	260	309	317	302	330

Rate of gain (lb./day)		
	(i.) Whole period	0·83 lb.
	(ii.) November–April	1·47 lb.
	(iii.) April–September	0·14 lb.

(*c*) Body Weights of Cows (lb.)	767	803	810	838	792	674	692

Body Weight Changes of Cows—	lb.	lb./day.
Whole period (November–September)	−75	−0·26
November–April	+71	+0·51
April–September	−146	−1·00

Pregnancy state (10–9–57)—pregnant 17, non-pregnant 2.

TABLE 2.

1957–58 SEASON.

Early Calved (Averages of 11 head of 2- and 3-years-old cows plus their calves).

	10–9–57.	10–10–57.	22–11–57.	31–1–58.	22–4–58.	28–5–58.	8–7–58.
(*a*) Milk Production							
Daily yield (lb.)	8·1	6·8	7·0	9·1	5·4	2·4 (1 dry)	1·1 (6 dry)

Estimated average total milk production = 186 gal. (Range 122–264 gal.).

(*b*) Calf Weights (lb.) (7 females, 4 males)	75 (av. age 12 days)	107	140	253	351	412	395

Rate of gain (lb./day)		
	(i.) Whole period	1·06 lb.
	(ii.) September–November	0·89 lb.
	(iii.) November–April	1·40 lb.
	(iv.) April–July	0·57 lb.

(*c*) Body Weight of Cows (lb.)	532	592	614	709	773	737	709

Body Weight Changes—	lb.	lb./day.
Whole period (September–July)	+177	+0·59
September–November	+82	+1·12
November–April	+159	+1·05
April–July	−64	−0·83

Pregnancy state (28–8–58)—pregnant 3, non-pregnant 8.

TABLE 3.

1957–58 SEASON.

LATE CALVED (Averages of 12 head of mature cows plus their calves).

	22–11–57.	31–1–58.	22–4–58.	28–5–58.	8–7–58.
(*a*) Milk Production					
Daily yield (lb.)	10·6	11·4	7·0	3·4	2·04 (4 dry)

Estimated average total milk production = 162 gal. (Range 113–225 gal.).

	22–11–57.	31–1–58.	22–4–58.	28–5–58.	8–7–58.
(*b*) Calf Weights (lb.) .. .. .. (8 females, 4 males)	86 (av. age 8 days)	197	304	332	340

Rate of gain (lb./day)		
	(i.) Whole period	1·11 lb.
	(ii.) November–April ..	1·44 lb.
	(iii.) April–July	0·47 lb.

	22–11–57.	31–1–58.	22–4–58.	28–5–58.	8–7–58.
(*c*) Body Weights of Cows (lb.) ..	664	751	782	769	739

Body Weight Changes—	lb.	lb./day.
Whole period	+75	+0·33
November–April	+118	+0·78
April–July	−43	−0·56

Pregnancy state (28–8–58)—pregnant 6, non-pregnant 6.

needs to be of good quality for best results. The digestive tract of the calf develops with age so that it is able to handle progressively greater quantities of pasture.

Growth Rate.

All calves in the investigation have grown fairly quickly during the November to April period. The typical slowing down has occurred during winter. Although they were receiving slightly less milk, the early-calved calves gained almost as quickly as their mates in 1957-58. This suggests that they were able to make better use of the summer pasture because of their greater age.

After April, the early-calved calves have made better weight gains than their mates—again probably because of their age. On a daily-rate-of-gain basis the late-calved calves are superior to the September-calved group. However, the September group are 55 lb. heavier and their performance since April suggests that they may be able to maintain this advantage.

Bodyweight Changes in Cows.

It is obvious that seasonal conditions, through their influence on feed supply, have a marked influence on bodyweights. In 1956-57 the cows calved in good condition in November and weighed 767 lb. They were 75 lb. less the following September. In 1957-58 the cows were about 100 lb. lighter after calving than in the previous year. However, they were able to gain 75 lb. to July, 1958. The early-calved 2 and 3 years old cows in 1957-58 were only 532 lb. after calving but gained 177 lb. during lactation. No doubt they were helped by the favourable pastoral conditions.

There is a severe drop in bodyweight after April. The average daily rates for the three groups were 1 lb.; 0.83 lb. and 0.56 lb. In view of the

Plate 2.

Mowing Lucerne in the Rockhampton District. The hay will be used as a supplement for breeders or weaners.

Plate 3.

The Portable Weighbridge Makes Possible Investigations Such as that Described in this Article.

comparatively low milk production after May, one wonders about the effect on the cow of weaning in May, even if it meant some form of supplementary feeding of weaners. A dry cow could be expected to winter much better than a cow in milk with a calf at foot. The dry cow would have a better chance to build up condition before her next calving. This could make earlier calving possible and ensure that the best use was made of any supplement which was fed either to the breeders or weaners.

Acknowledgments.

Thanks are due to Mr. J. Black and his staff for their co-operation in carrying out these observations, also Messrs T. Alderdice, formerly of the Cattle Husbandry Branch, and P. C. Davidson, Adviser in Cattle Husbandry for their capable assistance.

Eradicate This Disease

The left testicle of this boar is grossly enlarged because of inflammation. The right is normal in size.

You can see how big the swelling is. The testicle felt hot and harder than normal. The skin over it was red and thickened.

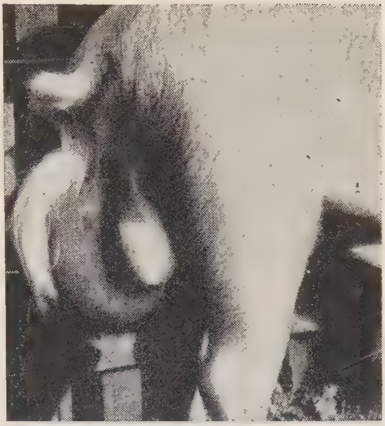
This boar had no contact with brucellosis before he was introduced into the piggery, which was known to be infected with it.

The inflammation is due to infection with *Brucella* germs.

This boar would almost certainly be infertile. Inflammation and infertility in boars is only seen occasionally even where *Brucella* infection is heavy.

The main symptom of brucellosis in pigs is that *sows* are infertile, that is, they are hard to get in pig.

Eradication is the only answer to this disease.



Infected pigs are detected by blood test and can be culled. Our Department fosters a brucellosis test scheme to ensure that pigs can be purchased free from this disease. Departmental officers or veterinary surgeons will co-operate in this way to eradicate it from a piggery.

If your sows are hard to settle, find out why. If brucellosis is the cause, eradicate it and keep it out by buying animals known to be free.

* * *

Townsville Lucerne

"J.M.," of Maleny, requests some information on the performance of Townsville lucerne in his district.

Answer: Townsville lucerne has been established successfully on the loose sandy ridges in the Gympie district. In particular, successes with this legume have been noted in the Woolooga and Oakview areas.

The planting method found most suitable was disc harrowing or tilling the soil and then lightly broadcasting the seed on the broken soil surface. Harrowing in the seed was found to be detrimental as it involved covering the seed too deeply, and the result was a reduced strike.

Townsville lucerne is an annual legume. The seed starts germinating in spring and early summer. It is advisable to commence planting in early summer when early storm rains may be expected.

About 2 to 4 lb. of seed will be required to an acre for satisfactory development in the native pastures which grow on these ridges. It is recommended that the seed be treated with the appropriate inoculum immediately before planting. This inoculum can be obtained free of charge from the Department upon receipt of the following:

Amount of seed to be planted and approximate date of planting together with your name and address.

It will generally be found that Townsville lucerne does not require fertilizing, as it has the capacity of establishing well on soils of low fertility.

When You See A Pig With Paralysis . . .

By B. PARKINSON,
Divisional Veterinary Officer.

Most pig farmers will at one time have seen pigs affected by paralysis of the hindquarters or an inco-ordination in movement. Such trouble is quite common to pigs, and can account for fairly severe economic loss. The causes are unfortunately so many and so obscure that very often it is impossible to make an accurate diagnosis of the condition. It is just as hard, in a lot of cases, to recommend any satisfactory treatment.

The various conditions are best dealt with under certain headings:—

(1) PARTURIENT DISEASES.

Parturient diseases are associated with the immediate after-farrowing period, and, of course, affect brood sows only. Fortunately they are all usually readily diagnosed, taking into account history and other symptoms.

(a) Metritis.

Metritis, or infection of the womb, occurs quite commonly after farrowing. The sow is visibly sick and has no appetite. She usually lies down and is not inclined to rise. Milk flow is considerably reduced, the piglets suffering accordingly. Fever with temperature up to 105 deg. F., is also common. A brownish discharge comes from the breeding passage.

The use of stilbestrol (to produce contraction of the womb and expulsion of the contents), plus antibiotics such as penicillin, streptomycin, oxytetracycline (Terramycin), or sulphonamide drugs gives good results in treatment.

(b) Mastitis.

Except that there is no discharge from the breeding passage, mastitis symptoms are much the same as for metritis. The udder is hard, inflamed, and painful. The sow frequently will not allow the suckers to nurse. Treatment with sulphonamides or antibiotics is satisfactory.

(c) Milk Fever.

Milk fever usually occurs very shortly after farrowing. Most cases show lack of appetite and decreased milk secretion. Sows become drowsy, and if untreated, progress through the stages of recumbency, paralysis and coma, to death. Occasional cases may show excitement, with staggery gait and paralysis of the hindquarters. There is no fever in an uncomplicated case.

The injection of calcium borogluconate ($\frac{1}{2}$ to 1 oz. dissolved in water) under the skin usually produces satisfactory recovery. It may be repeated every 6-8 hours if necessary.

(d) Acetonaemia.

Acetonaemia is due to a deficient diet and excessive drain on the sow to produce milk for the litter. Sows are affected about 2 weeks after farrowing and suddenly go off their feed, lose condition and show a wobbling gait and unsteadiness of the hindquarters. If they dry off they may recover. It not, paralysis and death usually follow.

The condition is prevented by correct feeding to ensure there is not a severe drain on the system. Treatment with injections of calcium borogluconate (as for milk fever) and 3-4 oz. of glucose in water twice daily usually produces recovery in several days.

(2) INFECTIOUS DISEASES.

All of the infectious diseases of swine, such as paratyphoid, erysipelas and pneumonia, in their very acute form, will cause staggering and partial paralysis. This is really more of a prostration, through general collapse. Laboratory aid is usually necessary in diagnosing these conditions.

Other conditions may be considered.

(a) Encephalomyelitis.

Encephalomyelitis, an inflammation of the brain and spinal cord, thought to be caused by a virus infection, has occurred on some occasions. Similar diseases are know to occur in European countries. In one outbreak affected pigs showed a stiff, proppy gait, with swaying of the hindquarters. The sequel depends on the severity of the disease, some recovering. There is no specific treatment.

(b) Leptospirosis.

Leptospirosis may cause a type of meningitis in pigs with similar symptoms to encephalomyelitis.

(c) Abscess Formation.

Abscess formation within the spinal cord may occur and lead to a progressive onset of paralysis of the hindquarters. Such a condition is usually only fully recognised on post-mortem examination.

(3) NUTRITIONAL.

Mineral and vitamin deficiencies seem to be of prime importance as a cause of trouble in pigs.

(a) Calcium Deficiency.

Pigs seem quite prone to a deficiency of calcium, whereas with cattle, a phosphorus deficiency is more common. Calcium deficiency leads to bone weakness. Stress factors, such as service of a sow by a heavy boar, standing on fences, or jumping, may initiate a fracture of the spinal column, pelvis or thigh bone. In these cases, the onset of a complete flaccid paralysis of the hindquarters would be sudden.

The use of high cereal diets alone could produce a calcium deficiency, particularly where there is a restricted milk supply for pigs. During dry times, when milk is in short supply, quite often the older pigs miss out on their milk, which is the main source of calcium on many farms. Deficiency could easily occur and account for some of the problems seen in adult pigs.

(b) Copper Deficiency.

Copper deficiency has been suspected as a cause of paralysis, particularly in New Zealand.

(c) Vitamin A Deficiency.

Vitamin A is an essential vitamin. Pigs deprived of such will show symptoms of nightblindness and a staggering gait. Posterior paralysis occurs, and pigs can only get about by sliding on their hindquarters. The onset may be quite sudden, and recovery can occur only in the early stages.

Vitamin A deficiency is most likely where there is a shortage of green feed, which is usually the main natural source of the vitamin to pigs.

(4) POISONINGS.

Mineral and plant poisons will cause inco-ordination and paralysis, but they are too numerous to consider here. When investigating this trouble in pigs, history of access to any poisons must be considered.

(5) PARASITES.

Kidney worm infestation has been blamed for many cases of paralysis. Unfortunately this is not always the answer. Under most conditions of management, an infestation of kidney worms takes several years to build up to a damaging level. Thus heavy infestations are rare in young pigs. Trouble from kidney worm infestation is not due to the effect of the worms burrowing in the loins as is popularly believed. Their actual effect is one of kidney damage, producing abscess formation or infection of the abdominal cavity, leadng then to paralysis.

(6) MISCELLANEOUS.

(a) Chorea.

Chorea is a disease of pigs between the ages of 10 days and 4 weeks. Affected piglets characteristically tremble and shiver throughout the head, trunk and limbs. The cause is probably congenital. Recovery usually takes place unless the piglets die of starvation through inability to suckle.

(b) Photosensitization.

Photosensitization occurs in white pigs only, when they are running out on fresh, green shoots of grasses and weeds on sunny days following rain. A characteristic dipping of the back just behind the shoulder is seen, the pigs knuckling over on their forelegs. Symptoms are seen particularly well a few minutes after they are chased into the sun after lying in the shade. The condition soon passes off. Pigs up to 5-6 months old are usually affected.

(c) Scrub Tick.

Scrub tick paralysis must always be considered where there is any possibility of such tick infestation.

(d) Constipation.

Constipation may be a possible contributing cause under some conditions.

(e) Injuries.

Injuries have been mentioned under deficiency, but can occur in well-nourished animals through misadventure.

(f) Arthritis.

Arthritis, with swollen joints, or sore feet may cause weakness and disinclination to rise.

TO PREVENT OR CURE.

Some of the major possible causes have now been discussed. Each case must be considered on its history, so that many possible causes can then be eliminated. It is hard to make a positive diagnosis in any one outbreak.

Most cases are usually beyond treatment once they are seen to be paralysed. Thus little satisfaction is obtained from many recommended treatments. Preventive measure for the future must be emphasised and these are mainly in association with dietary causes.

Check the ration. A change may do a lot of good. A milk and maize diet seems prone to cause trouble. Add other grains if possible.

Make sure you have an adequate supply of vitamin A. The use of a vitamin A concentrate supplement is essential if pigs do not have access to fresh young green feed, or lucerne hay is not fed in the diet. If trouble occurs, supply vitamin A concentrate liberally for a few weeks.

Check on the mineral status of the ration. Calcium is all-important. Particularly if milk is scarce, add ground limestone to the ration. This is also needed if a high cereal diet is fed. The ratio of calcium to phosphorus must be considered, for an unbalanced ratio with excess phosphorus (as is likely to occur with high cereal rations) may precipitate a calcium deficiency. Bonemeal supplements may be used if the ratio of calcium to phosphorus is not too wide.

The addition of copper sulphate may also be recommended.

If the pigs are likely to be constipated, they should be dosed with linseed or paraffin oil or epsom salts.

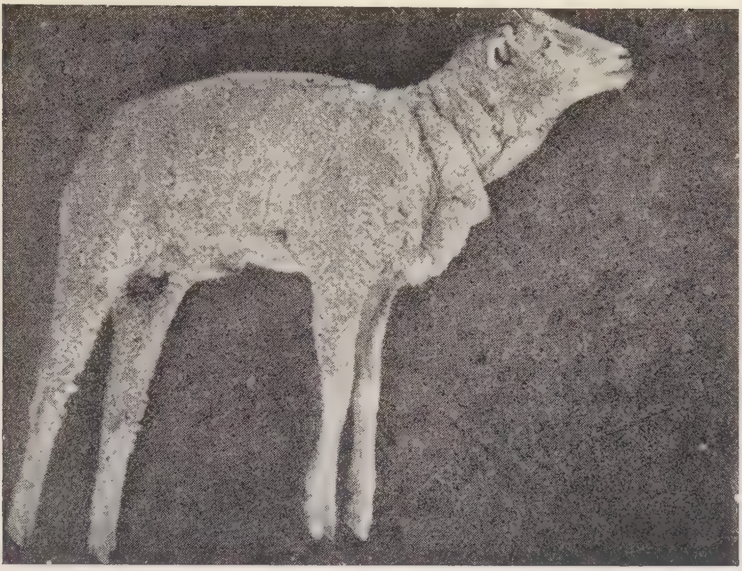


Plate 1.

This is the Typical Appearance of the Carcass of a Lamb Which Has Died of Tetanus.

Are you losing Sheep from Tetanus?

By G. LeGros,
Adviser in Sheep and Wool.

How many of your sheep die from tetanus each year? Are you sure that those dead sheep found after crutching, shearing, mulesing, lamb marking and dipping were not tetanus victims?

Tetanus is very widespread throughout Queensland. It is responsible for deaths ranging from a few sheep to several hundred. Tetanus is generally fatal. Sheep, horses, cattle, and human beings may be affected.

Characteristic tetanus symptoms usually show up from about the fourth day after infection to about the 14th day. In exceptional cases, symptoms can be observed earlier than the fourth day and up to four weeks. The early tetanus symptoms in sheep are stiff gait, hind legs spread and head and tail elevated. The sheep soon go down and exhibit rigidity of the legs and the head is arched backwards. The jaws are often, but not always locked. At this stage sheep are easily excited. A very characteristic symptom is the protrusion of the third eyelid across the eyeball from the inner corner. The death rate in sheep is nearly 100 per cent.

This common disease occurs after routine sheep work. At shearing, crutching, lamb marking, mulesing, and on dipping heavily grass infested sheep, the animals can pick up tetanus spores which often live for years around sheep yards, shearing shed, dips, and horse yards. Infection takes place through wounds, particularly deep ones, and when it has gained entrance the tetanus germ produces a poison which affects the nervous system. Tetanus can also enter the navel cord at birth or through mouth wounds caused by sharp teeth.

The treatment of valuable animals with anti-serum and antibiotic injections is sometimes carried out, but with only limited success. Under field conditions flock sheep suffering from tetanus should be destroyed humanely.

Preventing Tetanus

The well-known proverb, "Prevention is better than cure," applies very strongly to tetanus. Before shearing and crutching the board should be well scrubbed with disinfectant. Lamb marking and mulesing tools should be continuously dipped in a disinfectant solution during operations. If tetanus cases occur after lamb marking and mulesing, be warned, and next time mark your lambs in temporary yards well away from the infected area. This improved hygiene around the shed and yards and reduction of dust by watering will reduce tetanus infection.

Tetanus anti-serum gives immediate immunity which lasts about 14 days. Tetanus toxoid takes about two weeks to give permanent immunity. Both these injections can be administered at the one time with two separate injections. Another injection of tetanus toxoid 12 months after the original injection will ensure a life-time protection.

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A Collapsible Hive Stand

By C. ROFF,
Adviser in Apiculture.

Giant toads may congregate near apiaries and weaken colonies by snapping up bees entering or leaving the hives. These pests can be checked by placing the hives on stands about 2 ft. high.

The important feature of the stand from the migratory apiarist's viewpoint is the ease with which it can be put together and dismantled in the field. Furthermore, when dismantled, the components are readily packed on a motor vehicle for transport to a new apiary site.

Plate 1.

Two Hives Positioned on a Collapsible Hive Stand at Mr. O. C. Barnes's Apiary, Tinana.

The complete stand to carry two hives is constructed of grey ironbark timber. The five parts of each support are nailed together with 2¼ in. galvanised flat-headed nails through drilled holes with the nail ends clinched. (Plate 3.)

The timber required is as follows:—

Runners:
    2 pieces each 60 in. x 2 in. x 1½ in.
Supports:
    4 pieces each 25 in. x 2 in. x 1 in.
    6 pieces each 21 in. x 2 in. x 1 in.

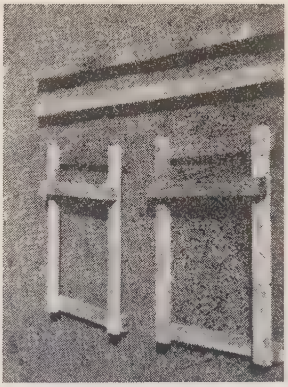

Plate 2.

The Two Supports and Two Runners of the Collapsible Hive Stand.

As the supports are slanted outwards (Plate 1), stability of the stand is assured by the weight of the hives locking the runners in the opening formed by the top cross-pieces. The bottom cross-pieces prevent the stand from sinking into the ground.

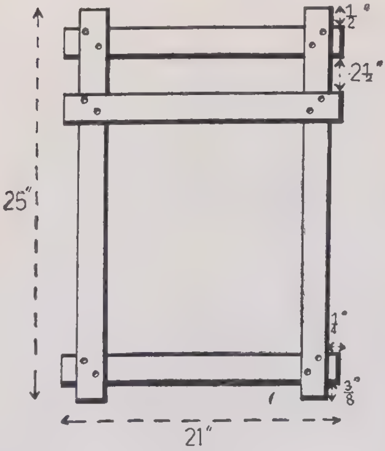

Plate 3.

Each Support Comprises Five Wooden Parts Assembled As Shown in This Plan.

Brucellosis-Tested Swine Herds

(As at 1st March, 1959.)

Berkshire.

S. Cochrane, "Stanroy" Stud, Felton
J. L. Handley, "Meadow Vale" Stud, Lockyer
O'Brien and Hickey, "Kildurham" Stud, Jandowae East
G. C. Traves, "Wynwood" Stud, Oakey
Westbrook Farm Home for Boys, Westbrook
H.M. State Farm, "Palen" Stud, Palen Creek
A. R. Ludwig and Sons, "Beau View" Stud, Beaudesert
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
R. H. Crawley, "Rockthorpe" Stud, *via* Pittsworth
F. R. J. Cook, Middle Creek, Pomona
Mrs. I. M. James, "Kenmore" Stud, Cambooya
H. L. Stark, "Florida," Kalbar
H.M. State Farm, Numinbah
G. L. Gabanko and R. H. Atkins, "Diamond Valley" Stud, Mooloolah
L. Puschmann, "Tayfeld" Stud, Taylor
C. E. Edwards, "Spring Valley" Stud, Kingaroy
V. F. Weier, "La Crescent," Clifton
N. Rosenberger, "Nevrose," Wyreema
L. P. Orange, "Hillview," Flagstone Creek
W. Young, Kybong, via Gympie
E. J. Clarke, Mt. Alford, *via* Boonah
G. McLennan, "Murcott" Stud, Willowvale
C. F. W. and B. A. Shellback, "Redvilla" Stud, Kingaroy
J. C. Lees, "Bridge View" Stud, Yandina
F. Thomas, "Rosevale" Stud, M.S. 373, Beaudesert
A. C. Fletcher, "Myola" Stud, Jimbour
Q.A.H.S. and College, Lawes
E. F. Smythe, "Grandmere" Stud, Manyung, Murgon
E. R. Kimber, Block 11, Mundubbera
A. J. Potter, "Woodlands," Inglewood
Regional Experiment Station, Hermitage
J. W. Bukowski, "Secreto" Stud, Oxley
R. Astbury, "Rangvilla," Pechey
L. Pick, Mulgildie
D. G. Grayson, Killarney
A. French, "Wilson Park," Pittsworth
P. L. Pfrunder, Pozieres

Large White.

H. J. Franke and Sons, "Delvue" Stud, Cawdor
Garrawin Stud Farm Pty. Ltd., 657 Sandgate road, Clayfield
J. A. Heading, "Highfields," Murgon
R. Postle, "Yarralla" Stud, Pittsworth
B. J. Jensen, "Bremerside" Stud, Rosevale, *via* Rosewood.
E. J. Bell, "Dorne" Stud, Chinchilla
L. C. Lobegeiger, "Bremer Valley" Stud, Moorang, *via* Rosewood.
H. R. Gibson, "Thistleton" Stud, Maleny
H.M. State Farm, Numinbah
S. T. Fowler, "Kenstan" Stud, Pittsworth
W. Zahnow, Rosevale, *via* Rosewood
Regional Experiment Station, Biloela
G. J. Hutton, "Grajea" Stud, Cabarlah
H. L. Larsen, "Oakway," Kingaroy
A. Palmer, "Remlap," Greenmount
G. I. Skyring, "Bellwood" Stud, *via* Pomona
G. Pampling, Watch Box road, Goomeri
M. Hall, "Milena" Stud, D'Aguilar
K. B. Jones, "Cefn" Stud, Pilton road, Clifton
Barron Bros., "Chiltern Hill," Cooyar
K. F. Stumer, French's Creek, Boonah
Q.A.H.S. and College, Lawes
R. S. Powell, "Kybong" Stud, Kybong, *via* Gympie
C. Wharton, "Central Burnett" Stud, Gayndah
S. Jensen, Rosevale, *via* Rosewood
V. V. Radel, Coalstoun Lakes
H. R. Stanton, Tansey, *via* Goomeri
L. Stewart, Mulgowie, *via* Laidley
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
O. J. Horton, "Manneum Brae" Stud, Manneum, Kingaroy
Dr. B. J. Butcher and A. J. Parnwell, 684 Logan road, Greenslopes, Brisbane
R. Kennard, Collar Stud, Warwick
A. C. H. Gibbons, Mt. Glorious
A. Kanowski, "Exton," Pechey
L. C. and E. Wieland, Lower Cressbrook
P. L. and M. T. D. Hansen, "Regal" Stud, Oaklands, Rangeville, Toowoomba.
J. C. Lees, "Bridge View" Stud, Yandina
R. Rhodie, Clifton
C. Assenbruck, Mundubbera
A. J. Mack, Mundubbera
J. & S. Kahler, East Nanango
C. P. Duncan, "Hillview," Flagstone Creek

Tamworth.

D. F. L. Skerman, "Waverley" Stud, Kaimkillenbun
A. C. Fletcher, "Myola" Stud, Jimbour
Salvation Army Home for Boys, "Canaan" Stud, Riverview
Department of Agriculture and Stock, Regional Experiment Station, Kairi
F. N. Hales, Kerry road, Beaudesert
T. A. Stephen, "Withcott," Helidon
W. F. Kajewski, "Glenroy" Stud, Glencoe
A. Herbst, "Hillbanside" Stud, Bahr Scrub, *via* Beenleigh
F. Thomas, "Rosevale" Stud, M. S. 373, Beaudesert
H. J. Armstrong, "Alhambra," Crownthorpe, Murgon
R. H. Coller, Tallegalla, *via* Rosewood
D. V. and P. V. Campbell, "Lawn Hill," Lamington
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N. R. Potter, "Actonvale" Stud, Wellcamp
L. C. and E. Wieland, Lower Cressbrook
J. D. Booth, Swan Ck., Warwick

Wessex Saddleback.

W. S. Douglas, "Greylight" Stud, Goombungee
C. R. Smith, "Belton Park" Stud, Nara
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
J. B. Dunlop, "Kurrawyn" Stud, Acacia road, Kuraby
M. Nielsen, "Cressbrook" Stud, Goomburra
G. J. Cooper, "Cedar Glen" Stud, Yarraman
"Wattledale" Stud, 492 Beenleigh road, Sunnybank
Kruger and Sons, "Greyhurst," Goombungee
A. Scott, "Wanstead" Stud, Grantham
G. C. Burnett, "Rathburnie," Linville
A. J. Mack, Mundubbera
J. Ashwell, "Greenhill," Felton South

Large Black.

E. Pointon, Goomburra

Facts On Fertilizers

By N. D. IRWIN and
A. R. HUGHES, Standards Branch.

STUDIES in plant nutrition have revealed that there are at least 15 elements essential for plant growth. These are nitrogen, phosphorus, potassium, sulphur, calcium, magnesium, iron, manganese, boron, copper, zinc, molybdenum, hydrogen, oxygen and carbon.

Nitrogen, phosphorus, and potassium are the plant foods used in largest quantities; hence it is usual for the soil to become deficient in these elements first when there is continued cropping or exposure to leaching.

Sulphur, calcium and magnesium are required in moderate quantities but are less liable to be present in the soil in less than favourable amounts. However, at times it becomes necessary to add these elements to the soil. When lime is used to correct soil acidity, calcium is added, while if dolomite is used as the neutralising agent, both calcium and magnesium are added. Sulphur is applied in considerable quantities when fertilizers such as superphosphate or sulphate of ammonia are used, as this element forms part of the chemical constitution of these compounds.

A third group of elements often found deficient in the soil are iron, manganese, boron, copper, zinc, and molybdenum which are referred to as micro-nutrients or "trace" elements as they are required by plants in very small quantities. Some of these may be applied to the soil to correct a deficiency while others are more effective when applied to the foliage as a spray. Used in excess, most of these elements are toxic to plant life which means that care should be taken to avoid over-dosage.

Of the remaining three essential elements, carbon and oxygen are obtained from the air in the form of carbon dioxide, and hydrogen from water in the soil solution.

COMMERCIAL FERTILIZERS.

Fertilizer is a material used to supplement the supply of plant foods in a soil and as the three plant foods which are most likely to be deficient are nitrogen, phosphorus and potassium, commercial fertilizers usually contain at least one of these elements in substantial amounts.

The materials used can be grouped into two broad classes—organic and inorganic. Organic fertilizers are derived from animal or plant sources and inorganic from mineral sources. The latter are often referred to as chemical fertilizers. Two synthetic compounds used as fertilizer, namely urea and calcium cyanamide, are classed by chemists as organic compounds, but when considered as fertilizers, they could well be included in the inorganic group as they are not of animal or plant origin.

The fertilizers available in Queensland are—

Organic.	*Inorganic.*
Dried blood	Nitrate of soda
Bone dust	Suphate of ammonia
Meatworks fertilizer	Urea
	Rock phosphate
	Superphosphate
	Sulphate of potash
	Muriate of potash

In practical agriculture, commercial fertilizers are used largely in the form of mixtures of several of the foregoing materials in various proportions. These are known to the trade as mechanical mixtures or mixed fertilizers and are formulated to provide the correct balance of plant foods for particular crops or soil types.

NITROGENOUS FERTILIZERS.

Nitrate of Soda.

The chemical formula of nitrate of soda is $NaNO_3$. Commercial grades of this material are used extensively as fertilizer to supply readily available nitrogen of which they contain approximately 16 per cent. Nitrate of soda is produced by mining crude deposits but it may also be manufactured synthetically.

Sodium nitrate is readily soluble in water and on application to a soil immediately becomes available to crops. This same property, and the fact that the nitrate is not held in the soil, renders it subject to leaching. The salt itself is neutral in reaction but on breakdown, it has an alkaline effect and can, therefore, to some extent, reduce the acidity of the soil. The breakdown results in a tendency to form a compact rather than an open soil structure. The continuous application of large quantities of sodium nitrate to some soils may, therefore, result in a poor physical condition and restricted movement of soil moisture.

Sulphate of Ammonia.

The chemical formula of sulphate of ammonia is $(NH_4)_2SO_4$. The commercial grades of this material used as a fertilizer contain from 20 to 21 per cent. of nitrogen.

Sulphate of ammonia sold as fertilizer comes from two sources—

(1) A by-product of the destructive distillation of coal and

(2) From synthetically produced ammonia.

Ammonium sulphate is soluble in water and is readily available to plants. It does not leach from the soil as readily as nitrate of soda. The application of sulphate of ammonia causes an increase in soil acidity and if used regularly, the resultant build up in acidity should be corrected periodically by the use of lime or other neutralising material. Except in the case where plants which thrive under acid conditions are being grown, it is considered that approximately the same quantity of lime as the sulphate of ammonia applied is required to maintain a desirable soil reaction.

Urea.

The chemical formula of urea is NH_2CONH_2. The fertilizer grade of urea contains approximately 46 per cent. nitrogen which is considerably higher than that in other nitrogenous fertilizers.

Under humid conditions crystaline urea absorbs moisture from the air which action can cause problems in packaging and handling. This is now overcome by pelleting and surface treatment.

Urea is freely soluble in water but indications are that when soil applications are made, nitrogen is not absorbed by plants to any extent in the form of urea. A short time after application, it most probably becomes converted to ammonium carbonate which compound later absorbs oxygen in two stages to be transformed into nitric acid and ultimately into nitrates. Thus after the initial stages of reaction in the soil, urea largely passes through the same forms and reaches the same end product as sulphate of ammonia does before becoming available for absorption by plants. If urea remained unchanged after application to the soil it would be rapidly leached out of the root zone by rain or irrigation water, but as it quickly changes to an ammonium salt which is adsorbed by the soil colloids, leaching is resisted and the fertilizer remains in the upper soil layers where it is in a better position to be used by plants.

Immediately on application, urea would have an alkalising effect on the soil but as it has no residual base, over a period of time, the ultimate effect would be to render the soil slightly acid. This acidity can be corrected in the normal way by the application of lime.

Urea may be applied to foliage as a spray to supply nitrogen to crops and when applied in this way, absorption is very rapid.

When urea is heated above its melting point, it decomposes, one of the products of decomposition being biuret $HN(CONH_2)_2$. During the process of manufacture, this material is often formed and so occurs as an impurity in commercial urea. This chemical is toxic to plant life particularly when applied as a foliage spray, therefore, urea which contains excessive quantities of biuret as an impurity should not be used for this purpose.

ORGANIC FERTILIZERS.

Dried Blood.

Dried blood is frequently used as a fertilizer to supply nitrogen of which it contains approximately 12 per cent. This fertilizer is obtained from slaughter houses where the blood is collected from the killing floor, dried and ground.

Nitrogen is present in organic fertilizers in the form of protein and must be converted into the nitrate form by soil organisms before it can be utilized by plants. This conversion goes through several stages each of which takes a certain time to complete, the protein is first converted to other organic products such as amino acids which are changed to ammonia and the ammonia in turn changes through nitrite to nitrate.

Meatworks Fertilizer.

Meatworks fertilizer, also known as blood and bone fertilizer, contains the plant foods nitrogen and phosphorus. The content of these constituents varies according to the raw ingredients used in its production; for instance, if the original material contains a high proportion of bone, the resultant product will be high in phosphoric acid and low in nitrogen. Various processing plants produce material in which the percentage of nitrogen ranges from 3.5 to 6 and that of phosphoric acid from 14 to 24.

Waste from carcasses of animals slaughtered for human consumption and also, on some occasions, whole

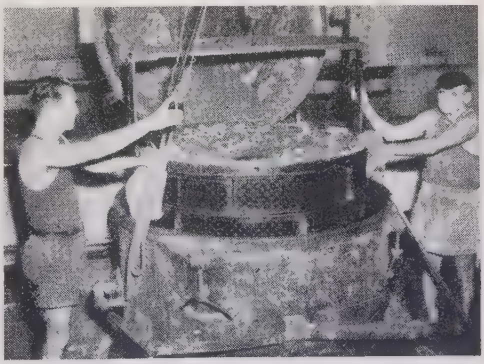

Plate 1.

Centrifuge Loaded With Meat and Bone from Digester.

carcasses which have been condemned for human consumption are heated in closed steel vats known as digesters. The heat is usually supplied by steam, either by passing the steam directly into the vat or through a jacket enclosing the vat. These processes are know as wet and dry rendering respectively.

During heating, fat is released from the bone, meat and offal in the digesters and is separated off and sold as tallow. The residue is dried, ground and sold as meatworks fertilizer. The digestion process sterilizes the tankage and destroys any disease organisms which may be present. Bone, after being subjected to this treatment, becomes somewhat brittle and offers little resistance to grinding.

The availability of the nitrogen in meatworks fertilizer is of the same order as that in dried blood and the phosphoric acid availability is comparable with that of bone dust.

Bone Dust.

Bone dust is primarily a source of phosphoric acid but it also contains a small quantity of nitrogen. Analyses show that it may contain up to 3.5 per cent. nitrogen and from 23 to 26 per cent. phosphoric acid.

Bone dust is composed of calcium phosphate and organic material consisting of fatty substances and a small amount of gelatinous material containing nitrogen. Bones are collected from abattoirs and butcher shops and cooked in digesters in the same way as tankage for meatworks fertilizer. Tallow is separated and marketed and the bones are ground to a powder and sold under the name of bone dust.

In Queensland standards for fineness are prescribed under the Agricultural Standards Act. Meatworks fertilizer and dried blood must be ground to such a size that the whole of it is capable of being passed through a sieve with square apertures of $\frac{3}{16}$ in. and bone dust must be fine enough to pass through a sieve with square apertures of $\frac{1}{10}$ in.

The labels attached to bags of these fertilizers must show percentages of fine and coarse material. Fine material is that which will pass through a sieve with square apertures 1/50th in. wide and coarse material is that retained on this sieve. Thus in the case of bone dust coarse material consists of particles less than $\frac{1}{10}$ in. and greater than 1/50th in., fine material is less than 1/50th in. For dried blood and meatworks fertilizer coarse material is less than $\frac{3}{16}$ in. and greater than 1/50th in., fine material is less than 1/50th in.

PHOSPHATIC FERTILIZERS.

When discussing phosphatic fertilizers, it is the practice to express the phosphorus content as phosphoric acid (P_2O_5). This is not chemically correct as phosphoric acid has the formula H_3PO_4. The correct name for P_2O_5 is phosphorus pentoxide or phosphoric anhydride, that is, it is the anhydride of phosphoric acid which means that the addition of water to this anhydride would give phosphoric acid, H_3PO_4. This method of expression gives a common comparison for all phosphates and is useful for evaluation purposes.

The phosphates most frequently found in quantity in fertilizers are monocalcic phosphate—$CaH_4(PO_4)_2$, dicalcic phosphate—$Ca_2H_2(PO_4)_2$, and tricalcic phosphate—$Ca_3(PO_4)_2$. Monocalcic phosphate is soluble in water and is the water-soluble portion of superphosphate. Dicalcic phosphate is not water-soluble, but is soluble in citric acid solution. A small quantity is present in superphosphate and represents the 0·5 per cent. citrate soluble phosphoric acid in this fertilizer. Tricalcic phosphate is insoluble both in water and citric acid solution. It is present in phosphate rock and bone.

Rock Phosphate.

Rock phosphate used in Queensland is obtained from Nauru, Ocean or Christmas Islands. The phosphates on these islands are replacement phosphates, that is, limestone deposits which have been converted to calcium phosphate by the action of phosphate solutions. These solutions come from guano deposited on the limestone over a long period of time. However, all phosphate deposits are not formed in this way and much of the world's commercial phosphate deposit is of sedementary origin. Marine organisms die and fall to the bottom of the sea. Through the ages, the organic matter in these organisms decomposes, the more soluble carbonates are leached out and a deposit rich in calcium phosphate remains.

The phosphate in rock phosphate is mostly in the form of tricalcic phosphate—$Ca_3(PO_4)_2$, which is insoluble and therefore, is not readily available to plants. For this reason. very little rock phosphate is used in its original form as fertilizer in Queensland. When it is used, it must be pulverised to a fine powder, as in this way the availability is increased somewhat. The phosphoric acid content of the material being marketed ranges from 37 to 39 per cent.

Superphosphate.

Superphosphate is the fertilizer most commonly used in modern agriculture to supply phosphorus. It usually contains approximately 20.5 per cent. water soluble, 0.5 per cent. citrate soluble and 1.0 per cent. insoluble phosphoric acid. It is manufactured from rock phosphate by converting the insoluble phosphate contained therein to a soluble form readily available to plants. The manufacturing process involves treating rock phosphate with sulphuric acid.

When superphosphate is applied to soil, some of it reverts to insoluble phosphates by combination with soil minerals. The rate of reversion which is often referred to as fixation is governed by the type of soil and the degree of admixture with the soil. Heavy soils usually have higher fixing powers than light soils and the elements mainly responsible for phosphate fixation are iron, aluminium and calcium; iron and aluminium in acid soils and calcium in alkaline or neutral soils. The reverted material is, however, in a fine state of division and so it becomes available more readily than the phosphate in the original rock phosphate. Phosphate applied to the soil as superphosphate is not leached out freely but fixation limits the amount of the added soluble phosphate that is absorbed by crops. For this reason, it is advantageous to place superphosphate as close as possible to the root zone of the plants for which it is intended such as when sowing seed, in a band close to where the seed is planted. When granulated or pelleted superphosphate is used, fixation is retarded as the surface area of the superphosphate in contact with the soil is reduced.

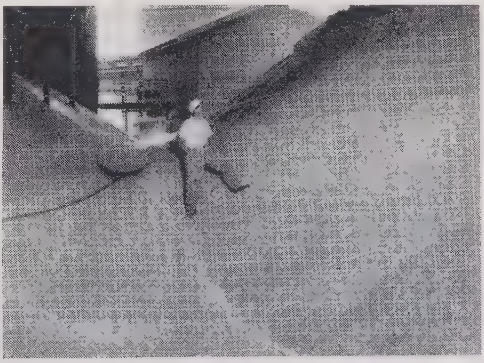

Plate 2.

Heap of Phosphate Rock.

Plate 3.

Mill to Pulverise Phosphate Rock.

The effect of superphosphate on the pH of the soil solution is negligible, and in this respect it can be considered to be neutral. Although superphosphate is not sold specifically to supply sulphur to the soil, it contains approximately 11 per cent. of this element and thus in practice appreciable quantities of sulphur are added to the soil in this way as superphosphate is often applied in liberal amounts.

POTASH FERTILIZERS.

The fertilizers used to supply potassium to the soil are potassium chloride and potassium sulphate. The quantity of potassium chloride used is far greater than that of the sulphate, the main reason being that the sulphate is more expensive. When a fertilizer is spoken of as containing a certain percentage of potash, the figure referred to is the percentage of potassium oxide (K_2O). This is a means of expression used by the analyst as a basis of comparison and it does not mean that the fertilizer actually contains potassium oxide as such. Potassium chloride, often referred to as muriate of potash, has the chemical formula KCl. Two grades are available as commercial fertilizer, one containing approximately 50 per cent. potash (K_2O) and the other approximately 60 per cent. potash (K_2O). The grade at present available in Queensland contains 60 per cent. potash. Potassium sulphate has the chemical formula K_2SO_4 and contains approximately 48 per cent. potash (K_2O).

Potash fertilizers are obtained by mining deposits of soluble potassium salts occurring in Central Europe, Palestine, and America. It is thought that these deposits were laid down throughout geological ages by areas of sea being cut off and formed into lakes. The water in these lakes evaporated and the salts in solution were deposited.

Most of the potash used as fertilizer is applied in the form of chloride. However, in Queensland, potassium sulphate is used in tobacco mixtures as the chloride intake of this crop must be kept low. It is also preferred in pineapple fertilizers which are to be used on mature plants.

When used as fertilizer neither potassium chloride nor potassium sulphate have any appreciable effect on the pH of the soil. Both of these fertilizers after being added to the soil dissolve and ionize. Some of the potassium is adsorbed by the soil colloids in an exchangeable form, some goes into the soil solution and is taken up by plants and the remainder is leached to lower soil levels. Its movement through the soil is not as rapid as is the case with nitrogen but it moves more freely than phosphorus.

MIXED FERTILIZERS.

In practical agriculture it is often necessary to apply more than one nutrient at a time to the soil in order to achieve optimum results and the most convenient method of doing this is to use mixtures of two or more of the materials already described.

Ready-to-use mixed fertilizers are available from all fertilizer companies. These products contain appropriate proportions of nitrogen, phosphorus and potassium balanced to suit particular crops and soil types.

Compounding mixed fertilizers presents its own problems as it is not always easy to prepare mixtures which reach the farm in a free flowing condition. It is interesting to note that when sulphate of ammonia is included in fertilizer mixtures containing superphosphate, the mixture may set hard, due to a chemical reaction between the ammonium sulphate and the mono calcium phosphate. When these two fertilizers are combined in a mixture, time should be allowed for curing to enable completion of this reaction. The gypsum formed has two molecules of water of crystalisation one of which is obtained from free moisture in the fertilizer. This gives a dry mixture and once the reaction is completed, setting from this cause will not occur again. The inclusion of conditioning agents such as absorbent organic matter in a mixture will help to reduce caking.

Grade Formula.

The "grade formula" is a term regularly used in connection with mixed fertilizers and refers to the percentages of nitrogen (N), phosphoric acid (P_2O_5) and potash (K_2O) contained in a mixture in that order. The grade formula is usually shown on fertilizer labels.

Granulation.

A number of fertilizers are now prepared in a granulated form. This process produces a fertilizer which is free running thereby facilitating application by mechanical distributers. Granulated fertilizers also have less tendency to cake or set hard which is an advantage in humid climates.

There are several processes which may be used to granulate fertilizer but rotary drying or spraying are the methods generally used. For materials such as urea and nitrate of soda, which can be melted, the spraying method produces a pellet of uniform size. The molten material is sprayed upwards through jets to form droplets, during their passage through the air these droplets solidify into pellets. The rotary drying process may be used to granulate fertilizer mixtures. When using this process, the fertilizer is first mixed and then the moisture content adjusted to the optimum for granulation. The mixture is introduced into a rotary kiln and granulated, the granules are set by drying.

Legislative Control.

In Queensland the sale of fertilizers is governed by Regulations under *"The Agricultural Standards Act of* 1952" and "The Agricultural Standards (Fertilizer and Lime) Regulations of 1956" whereby fertilizers must be registered before being offered for sale.

The Queensland primary dealer is required to submit to the Standards Branch, Department of Agriculture and Stock an application for registration which shows details of the ingredients used in producing a specific formula. The information

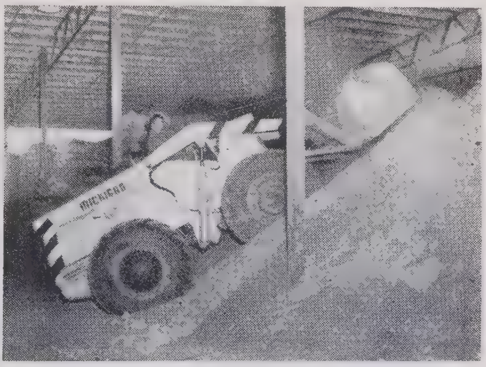

Plate 4.

Bulk Handling Fish Meal.

Plate 5.

Digesters for Dry Rendering.

supplied in the application is carefully scrutinized to see that the formula is practical and accurate. The guaranteed analysis shown on the label attached to every bag is required to specify amounts of available nutrients present in the fertilizer. Registration of all fertilizers offered for sale in Queensland is undertaken to ensure that due attention is given to these points.

Fertilizers offered for sale are regularly sampled and analysed by Departmental officers to ensure that they conform with the specifications shown in their guaranteed minimum analysis.

Labels.

The label attached to, or printed on, each package of fertilizer sets out the following information:—

(1) The name of the fertilizer.

(2) The net weight of the fertilizer.

(3) The guaranteed analysis.

(4) The name and address of the manufacturer or Queensland primary dealer.

From the farmer's point of view, perhaps the most important of these items is the guaranteed analysis which helps to prevent materials of low analysis being sold at prices above their actual value. It shows the active constituents of a fertilizer and enables the farmer to select a product to suit his particular requirements.

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Fellows, Furrows, and Fallows

Farmers' field days help to promote free discussion and exchanging of ideas.

Orchard and Garden

NITROGEN, one of the most important substances required for tree growth, is, unfortunately, the one most frequently deficient in our own citrus soils. Citrus trees require a certain amount of nitrogen at all times of the year.

Since sulphate of ammonia, the fertilizer commonly used to supply nitrogen, is readily leached out of the soil, regular dressings of fertilizer are needed. A good supply of nitrogen is required just before blossoming and in early summer to assist fruit setting and fruit growth.

In addition, a further dressing containing nitrogen should be applied after the wet season to replace the losses from leaching. Early maturing varieties such as the Washington Navel will require the fertilizer late in February to benefit the maturing crop. Valencia Late oranges, Ellendale mandarins and other varieties can receive their dressing in March or April.

—E. L. HASTIE,
Horticulture Adviser.

LEAF pruning is necessary in strong-growing varieties of grapes like the Muscat Hamburg. A dense canopy of leaves in and around the developing bunches tends to promote uneven growth of the berries, hampers disease control and interferes with harvesting.

Leaf pruning pays off even though it's a tedious job. In Muscat Hamburg grapes, leaf thinning should start soon after the bunches have set and the berries are about ⅜ in. in diameter. It's a "peacemeal" job in which leaves in and around the bunches are removed at fortnightly intervals as the berries develop. Sudden and severe leaf pruning may cause loss of fruit from sunburn. The standard rule is to start leaf pruning early in the season and to do it in easy stages.

—C. N. MORGAN,
Senior Adviser in Horticulture.

GROWERS wanting to sell planting material of Lady Finger or Sugar bananas during the 1959 planting season, which commences on August 1, 1959, are reminded by the Banana Industry Protection Board that permits to remove planting material of those varieties are granted only when the source of supply is an Approved Plantation.

To qualify for approval, a plantation must be well managed, free from Panama and Bunchy Top diseases and the plant type must be up to recognised commercial standards. Two inspections of each nominated plantation will be made by officers of the Department of Agriculture and Stock.

The first inspection must be carried out some time between March 1 and May 31. Any plantation which is not inspected during that period will not be eligible for approval. Application to the Board should therefore be made early enough to ensure that the first inspection can be carried out within the appointed period.

The second inspection will be carried out in the spring when applications to remove planting material are received.

Application forms may be obtained from the district offices of the Department of Agriculture and Stock, and the completed forms should be lodged with the Board's agents as early as possible and not later than March 31, 1959.

for the junior farmer

By J. PARK,
State Organiser,
Queensland Junior Farmers' Organisation.

IN subsequent issues we shall discuss the function of club officers, and the rules for the conduct of meetings. Before doing so it is advisable that members should be familiar with some of the more common terms used in meeting procedure.

"Ad hoc".—A committee that is appointed to carry out a particular task, and that automatically ceases to exist when the task is completed, is an "ad hoc" committee. Compare this with a standing committee.

"Agenda".—The business to be carried out at any meeting is the "agenda" of that meeting.

"Amendment".—Any alteration to a resolution or motion. (See definition of resolution and motion.)

"Ballot".—Voting in such a way that those taking part are in ignorance of one another's opinion: for example, a "paper vote" or "secret" ballot.

"Carried".—When a resolution is passed, that is, the majority vote is in its favour, it is said to be "carried". (See motion.)

"Casting vote".—The chairman usually has the right to give, under certain circumstances, a vote that is additional to the one he has as a member. This is his "casting" vote. The chairman gives his casting vote only if the voting in which he has taken part is equal. If, however, in spite of equal voting, the chairman decides not to exercise this right, the matter must be laid aside, and cannot be dealt with again at that meeting. It should be noted that the chairman does not use his casting vote unless he has already used his vote as a private member.

"Circulate".—To send round to all members. Sometimes the minutes of the last meeting are "circulated" before the next one is held.

"Convene".—To summon members to a meeting is to "convene" that meeting.

"Co-opt".—If a committee, when it is appointed, is given power to "co-opt", it must add to its number by inviting a stated number of other people to join in the work. A committee may not co-opt additional members unless the resolution or rule appointing them says so.

"Eligible for re-election".—An officer or a member of a committee is elected to serve for a definite period—usually a year—and when that period comes to an end he retires, and there is an election. If the rules allow him to be elected again for a further period, he is "eligible for re-election".

"Ex-officio".—By virtue of office. It is usual for the club Leader to be "ex officio" a member of all sub-committees.

"Honorary".—When used as in "Hon. Sec." (honorary secretary) it means "unpaid".

"In order".—If a member stands and says "Am I 'in order', Mr. Chairman, if I ask whether . . ." he means that he is asking if the chairman will allow him to put this question, or whether some article in the constitution, or some rule of procedure, or the chairman's own ruling, forbids it. Similarly the chairman may rule a member "out of order" if his actions or words infringe some article of the constitution, some rule of procedure, or the chairman's own ruling. Upon being ruled "out of order" the member concerned must immediately desist.

"Minutes".—The written record of what took place at a meeting.

"Motion".—Before a resolution is passed it should, strictly speaking, be called a "motion." When passed, a motion becomes a resolution. In these articles, however, the word "resolution" is used in both senses, and the word "motion" is used infrequently.

"Move".—To move a resolution or motion is to propose it.

"Nominate".—To nominate a person is to propose that he shall be put up for election to office or to a committee.

"Point of order".—If any member thinks that one of the rules of debate or procedure is being broken, he may rise to his feet and say, "Mr. Chairman, on a 'point of order' . . . so and so . . ." The chairman must at once consider this objection even though it interrupts a speech. His ruling (decision) is final, and may not be discussed.

"Proxy".—One who takes the place of, and is empowered to act for, another.

"Put the resolution or motion".—To put it to the vote, that is, to ask the members to vote on it.

"Quorum".—The minimum number of members needed for a meeting to be held.

"Rescind".—To rescind a resolution is to cancel it. As no resolution that has been dealt with can be discussed again at the same meeting, a resolution passed cannot be rescinded until, at the earliest, the next meeting, and then only if notice is given before the next meeting.

"Resolution".—A resolution is either a proposal that something shall or shall not be done, or an expression of opinion by the meeting that passes the resolution.

"Ruling".—At a meeting, final authority is in the hands of the chairman. If he orders that something shall or shall not be done, he has made a ruling to this effect.

"Second".—At least two members must indicate that they wish to have a resolution discussed before discussion by the remainder may be permitted. The first of these two members will stand and say "Mr. Chairman, I move (propose) that . . . because . . .". This member is known as the "mover" or "proposer". The second member stands when the mover has finished speaking and says, "Mr. Chairman, I wish to second this resolution (motion), because . . . ". A resolution may be seconded "pro forma" without the seconder giving argument in favour. (In this case the resolution is seconded to prevent it from "lapsing for want of a seconder".)

"Standing Committee".—A permanent committee. Even though its members may change from year to year, the group remains in being.

"Standing orders".—These are the rules that govern the way in which a meeting shall be conducted. (A club's standing orders might well be drawn up from the articles which will appear here.)

"Sub-committee".—Routine matters of club management are usually in the hands of the officers or the executive committee, but other committees are often set up to deal with special matters. These committees are sub-committees of the executive committee, hence their name.

"Taken as read".—If the minutes of a meeting are circulated to members before the next meeting, they are not usually read out by the secretary. The chairman asks "Is it your wish that the minutes of the last meeting be 'taken as read'."

"Terms of reference".—These are the instructions given to a sub-committee when it is set up.

"Ultra vires".—If a meeting makes decisions on matters over which they have no authority, these matters are described as "ultra vires" in so far as that meeting is concerned. Such would be the case if the executive committee, without instructions from club members, made important decisions regarding the club programme. They would thus be acting "ultra vires".

"Unanimous".—Voting is unanimous when all those persons entitled to vote at a meeting do so, and when all vote the same way.

"Urgency, matters of".—These are matters upon which decisions are needed at once. They may arise during the course of a meeting or between meetings.

"Verbatim".—Word by word. A speech that is recorded "verbatim" is written down exactly as it is spoken.

Hints For Club Members

The financial year of the Junior Farmers' Organisation ends on March 31, and all annual meetings and elections of club officers must be conducted during April. Copies of the club leader's annual report and the financial statement and balance sheet must be sent to the State Organiser.

The Annual State Conference of the Junior Farmers' Clubs will be held this year at the National Fitness Camp, Burleigh Heads, from April 27 to May 1 inclusive. This is the most important function in the junior farmer calendar, and each club should be represented by a delegate and an observer.

Bush Book Club's Good Work

"WHEN the Bush Book Club was formed 36 years ago the small group of six women who formed the original committee did not conceive that their link of friendship between city and country would grow into a chain stretching from Cape York Peninsula to the borders of New South Wales in the south and the Northern Territory in the west.

"That original ideal of sending out literature as a gesture of friendship from friends in the city to all in the country who are beyond the reach of Public Libraries is still our guiding thought and during the past year we have distributed well over 20,000 books to members as well as many hundreds more to deserving organisations.

"As our parcels go on from reader to reader instead of coming back to headquarters each time it is not possible for us to have a catalogue so that members may choose their own books but we pack always to a definite plan. Each parcel contains ten books and as many magazines as we can spare. First a book chosen for better reading, then romances, thrillers, westerns so as to give as wide a selection as possible for family reading. If the parcel is worn when it reaches the third or fourth reader (for books naturally tend to wear with so much travelling) we send a supplementary parcel on request to bring it to full strength again.

"We do not now regularly include children's books in all parcels but send them when asked for or when we know there are children in a family."

—*Extract from the Annual Report of the Queensland Bush Book Club, by the honorary general secretary, Mrs. A. GOLDSMITH.*

The Farm Family

Looking After Old People

Given enough years of living, we shall all know what it is to be old. Shall we, by our understanding and consideration of old folk today, have earned for ourselves the right to a happy tomorrow?

The physical needs of old people are usually not great, and the best general guide is moderation in all things. However, we must not go to the other extreme and underestimate the things needed to keep the elderly person fit and well. Here are the main points:

Food

Old people are inclined either to over-eat (frequently through lack of other interests) or to subsist so meagrely that they are undernourished. Too many are apt to confine themselves to a diet of tea and bread and butter.

Old people, as well as younger folk, need a varied diet, including a little of each of the good foods. It is better for meals to be small and fairly frequent, rather than bulky and at long intervals. It must be remembered that over-eating means overweight, one of the greatest dangers to health in old age! Drinking plenty of water will help to avoid the cramps of old age.

Clothing

Old people need to be well-wrapped in cold weather, so they are not tempted to rely for warmth on stuffy rooms. Being dressed in outdoor garments, rather than gowns and slippers, will encourage them to seek the fresh air and mild exercise.

Activity

Moderate activity is far better for old folks than inertia. Performing small household tasks and taking walks will help provide healthy exercise and a wholesome mental attitude. However, the elderly person must never try to repeat the physical feats of his younger days. Especially to be guarded against is hurry, which imposes dangerous strain on the heart and circulatory system. Moderate activity in old age is good, provided a calm, unhurried attitude is cultivated.

Rest

Sometimes old people worry unnecessarily about the fact that they don't sleep so much at night as they once did. This is quite normal, and to be expected, especially if they follow the wise habit of having a daily doze after lunch. As a general rule, old people should have small rests frequently.

Safety

We must remember that old people don't see and hear so well as the young, and their muscular reactions are slower. All furniture, rugs and household equipment should be examined with an eye to accident prevention, especially the preventing of falls. Stairs should be well-lighted and have hand-rails. Safety in the bath for old folk demands hand-rails and a rubber mat.

Warning Symptoms

In the care of old people, keen observation is needed. Tell the doctor without delay about any sudden change in condition. It is especially important to report a persistent cough, sudden loss or gain in weight, bleeding from any part of the body, spells of dizziness, vision disturbances or a thickness of speech.

It cannot be too strongly emphasised that the old person is not a machine, to be satisfied by mere physical maintenance. There are probably many more old folk made unhappy through mental rather than through physical causes.

Attitude of Aged

Much depends on the attitude of the old person himself. If there is a secret of "How to be happy though old," it lies in having a purpose in life. This calls for a positive outlook by the old person. The way to look at retirement is to retire not "from" something, but "to" something. It should be seen as a release from the worries and business of money-making; a new freedom to follow a bent, to do things so long dreamed of "when I have time."

There are some old people full of enthusiasms, always finding something fresh and interesting, especially in the way of helping others. They enjoy life. Yet often their contemporaries, sometimes as much as 10 years younger, simply sit around waiting for the end! In idleness there is nothing but decay. But, however restricted physically, the old person need never be mentally idle. We can be happy in old age if we continue to look out on the world rather than in on ourselves.

Attitude to Aged

We must never forget that old people need desperately a sense of belonging and usefulness. As much as possible, they should be allowed to help in small ways, and made to feel that their help is appreciated.

Old people should be encouraged to make contact with the outside world. It will help them to keep alert mentally and physically, and help to prevent boredom. We should remember that for old people it is a "day of small things," all of which help to keep life interesting. In case of forced inactivity, the radio can be a boon.

Privacy and personal belongings are very precious to old people. A room of their own, with some family possessions about them, can give them a much-needed sense of security. They should be encouraged to have their own friends and allowed to make some decisions regarding such things as their clothes. This will help them from feeling completely dependent.—*Contributed by Queensland Health Education Council.*

* * *

New Book Out

THE Honey Flora of South-Eastern Queensland, by S. T. Blake and C. Roff. Outstanding features of this book are the large number of excellent illustrations, as well as descriptions of trees and plants of interest to apiarists, farmers, graziers, and naturalists.

The price is 15s. A reduction of 20 per cent. is allowed for registered apiarists, university students of botany, and booksellers. To those outside Queensland, the price is £1.

The book is obtainable from the Under Secretary, Department of Agriculture and Stock, Brisbane.

Vealers on dairy farms ... do they pay?

By D. N. SUTHERLAND,
Director of Cattle Husbandry.

While market prospects for dairy products other than wholemilk are not promising, prices being realised for heavy vealers of the larger dairy breeds are satisfactory. This situation naturally leads to consideration of the practicability of increasing production of heavy vealers on dairy farms as a means of raising net income.

It has been found that:

- At present prices for dairy products and for vealers (20-1-59), gross returns from vealer production are considerably less than can be expected from dairying associated with pig raising.
- Vealer production requires less labour and for this reason it may offer net returns comparable with those from dairying on large farms with low output of butterfat per cow.
- Where labour released from duties associated with dairying is used to increase fodder production through pasture improvement and cropping, gross returns from vealer production could be increased substantially.
- There does not appear to be any application at present for the system of multiple suckling of calves on one cow for vealer production in Queensland.

The Price Range

The term heavy vealer usually refers to calves six to 12 months of age with carcass weight usually in the range 200–350 lb. The price range for this class of animal has varied over the past two years from £7 to £9 per 100 lb. carcass weight, giving a return of £14 to £30 a calf. Where vealers are reared in the conventional manner on their own dams this return has to be compared with the return per cow from butterfat or other dairy products, plus the price obtained for

TABLE 1.

RETURNS FROM A HERD OF 50 COWS.

Production/Cow. Lb. Commercial Butter.	Returns from Butterfat.	Value of Skim-milk for Pig and Calf Feed.	Return from Bobby Calves.	Return from Vealers.	Sale of Cull Cows.	Gross Return.
	£	£	£	£	£	£
(*a*) 150 lb.	1,250	225	80	..	300	1,855
(*b*) 175 lb.	1,460	262	80	..	300	2,102
(*c*) 200 lb.	1,670	300	80	..	300	2,350
(*d*) Vealer production (40 vealers)	..	..	..	880	300	1,180

the bobby calf and the value of the skim-milk for pigs.

Vealers or Butter ?

In Table 1, estimates are given of the relative returns for a herd of 50 adult cows from butterfat at various levels of production with values for skim-milk for pig feeding and bobby calves, compared with returns from vealer production of a herd of similar size. These estimates as based on returns of 3s. 4d. a lb. for commercial butter, 4d. a gallon as value of skim-milk for pigs and £2 a head for bobby calves. It is estimated vealers are sold at nine months with average dressed weight 275 lb. and a price of £8 per 100 lb. dressed weight.

It will be seen that the gross returns from vealer production are less than can be obtained from dairying even at relatively low levels of butterfat production. But, as the amount of labour required is considerably less for vealer production, the net returns could under certain circumstances favour this enterprise. However, vealer production is likely to offer a satisfactory net return compared with dairying only in the case of large herds with moderate to low output per cow. In small herds gross returns from vealers would not give an adequate income, and in herds with high production per cow, the returns from butterfat should more than compensate for the cost of additional labour.

However, if the labour freed from duties such as milking and feeding of calves and pigs is devoted to increased fodder production through pasture improvement and cropping, a considerable increase in gross returns from vealer production could be expected.

As a Sideline

Vealer production may also be considered as an adjunct to dairying rather than a substitute. Two systems of production warrant consideration :—

1. On larger farms, the concentration of the dairying enterprise on improved areas of the farm close to the milking shed with the balance of the farm being used for the rearing of vealers.

2. The system of multiple suckling of a number of calves on a few cows with the remainder of the herd still being milked.

The application of the first of these systems is a matter which could be decided only in relation to its suitability for a particular farm. On

TABLE 2.

Stage of Lactation	Cow Producing 375 gal. Milk in 300 Days.		Cow Producing 750 gal. Milk in 300 Days.		Calf.	
	Milk.	D.P.	Milk.	D.P.	Live Weight.	Requirement of Protein/ day.
Days.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
1	15	·48	30	·96	70	·30
30	19	·61	38	1·24	95	·38
60	17	·54	36	1·08	130	·46
90	15	·48	33	·96	175	·55
120	13	·42	28	·84	220	·62
150	12	·38	25	·76	270	·67
180	11	·35	23	·70	320	·72
210	10	·32	20	·64	375	·77
240	9	·29	18	·58	440	·82
270	8	·26	16	·52	495	·84
300	7	·22	14	·44	550	·84

some farms it may provide the most economical method for use of resources such as land, labour and livestock.

Multiple Suckling.—The system of multiple suckling of a number of calves on one cow is reported to be used widely in the United Kingdom. By suckling four calves on one cow for the first three months of the lactation and three for each of the next three months, one cow can rear 10 calves up to the age of three months. There are two main requirements—the cow must be fed for high milk production and good feed must be available for the calves when they are weaned. These conditions do not apply to most properties in Queensland.

In Table 2 are given estimates of the daily milk production and its content of protein at various stages of lactation for cows at two levels of production together with estimates of the daily requirements of protein for a calf to be turned off at dressed weight of 275 lb. at nine months. The figures for milk production are based on a normal lactation curve where feed is available in accordance with the change in the cows' productive capacity at different stages of lactation. Under Queensland conditions, with wide fluctuations in availability of feed from pastures and crops, milk production would vary from the figures shown in this table.

At the lower level of production, the cow could be expected to rear one calf satisfactorily for the first three months and one for the second three months. At the higher level of production two calves could be reared in the first three months, but the cow would need additional feed during the second three months if two calves are to be reared.

One further calf could be reared in the third three-month period. It should be stressed that good feed such as improved pastures, crop or other supplements would be needed to keep the calves growing after they are weaned from the cow. Under Queensland conditions this could well be the critical factor in production of good quality vealers.

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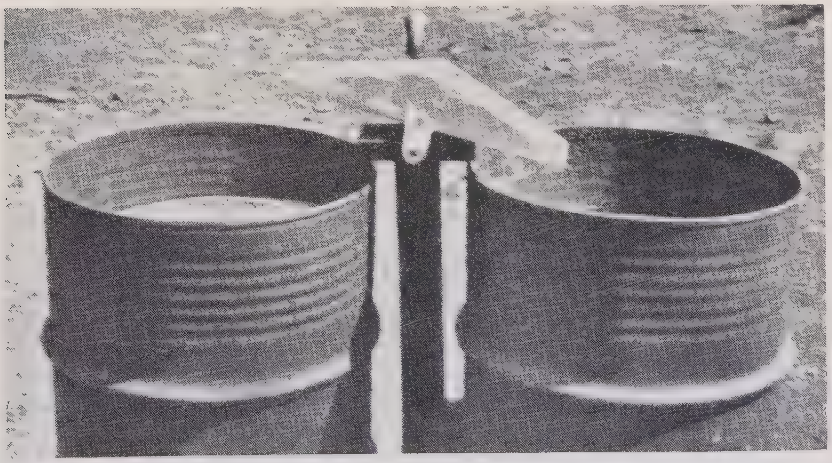

MR. ISEPPI at Bowenville, built this gadget for the end of his skim-milk pipeline because there is more than 44 gal. of milk. The equaliser dispenses with the necessity to be continually watching the one drum when it is nearing the full mark. There is no time lost in going down to the piggery to change drums. Also skim-milk losses are nil. Where more than one drum is being used, spillage may result. If necessary the drums can be easily moved. The milk runs from the pipe into one of the chambers. The chamber fills and upsets the balance, so that the equaliser tips to the left, bringing the right side under the pipe outlet to fill and tip, thus repeating the process and dividing the milk evenly between the two drums.

Bucket and Bail

IF you have to use antibiotics to control mastitis in your herd, remember that the milk from treated cows mustn't be used immediately after treatment. This is because traces of the antibiotic persist in the milk after treatment has been completed. As an easy-to-remember rule, withhold the milk from cows treated for mastitis with antibiotics for three days after the final dose. Milk containing even traces of antibiotic is a real problem in the cheese industry. Here, the antibiotic reacts with the cheese starter organisms, causing "slow vats" and lowered cheese quality.

Antibiotics have a very real place in curing mastitis if used with discretion. But any dairyfarmer who relies on them entirely to prevent mastitis can expect trouble.

—*W. D. MITCHELL,*
Dairy Technologist.

TO get best use from your milking machine vacuum pump, keep it clean and lubricate it properly. Dust drawn into the pump is held by the oil, and forms a thick, gummy mass which stops the blades from sliding in their guides. It forms an excellent abrasive to wear away the bearings and the pump barrell.

Firstly clean out the oil wells, fit a new piece of pipe cleaner and slide a piece of thin copper wire down each oil tube. Adjust the pipe cleaner ends, so that the oil well is nearly empty at the end of milking. Flush out the pump by pouring a soft drink bottle full of a mixture of half oil and half kerosene into the suction hole while the pump is revolving. Do these things at least every 6 months for best results from your pump.

—*J. D. ELRINGTON,*
Senior Adviser (Machinery).

Plan Now For May

TO dry off cows, stop milking them entirely.

Cows require 4–8 weeks' dry period before calving.

Prepare suitable calf paddocks for rearing young stock.

Have the mechanical efficiency of the milking machine checked during the winter months.

Cows In Merit Register

COWS that qualified for entry into the Herd Recording Section's Intermediate Merit Register (three successive lactations) during February were: Kenstan Sadie 3rd., A.I.S. cow owned by T. W. Fowler, Pittsworth; Yarranvale Myrtle 4th., A.I.S., J. Phillips and Sons, Kingaroy; Glen Erin Effort's Viola, Jersey, J. P. McCarthy, Greenmount; Yarallaside Countess, Jersey, R. S. and G. C. Postle, Pittsworth; Holm Park Lady Marion, Ayrshire, L. C. Norgaard, Nara.

Entry into the Lifetime Merit Register (2,240 lb. butterfat) was gained by Chelmer Lulu 7th., A.I.S. cow owned by A. R. Hayes, Tarampa.

Dairy Refrigerators Lift Milk Quality

By V. H. J. CALEY,
Assistant Dairy Technologist.

Farm dairy refrigeration was made economic in Murgon by a financial incentive, and its introduction caused the hygienic quality of raw milk to show a spectacular improvement. The proportion of milk with a methylene blue time of 4 hours or more increased from 42 per cent. in the nine months until March, 1957, to 86 per cent. in the nine months until March, 1958.

Farm dairy refrigerators to the value of £13,000 were installed last year on farms around Murgon. The farms involved are those supplying milk for pasteurising and bottling, and the refrigerators are used mainly for evening's milk, which is refrigerated and held overnight, and delivered with the morning's milk to the factory. Not one milk refrigerator was in the district at the time, so it might well

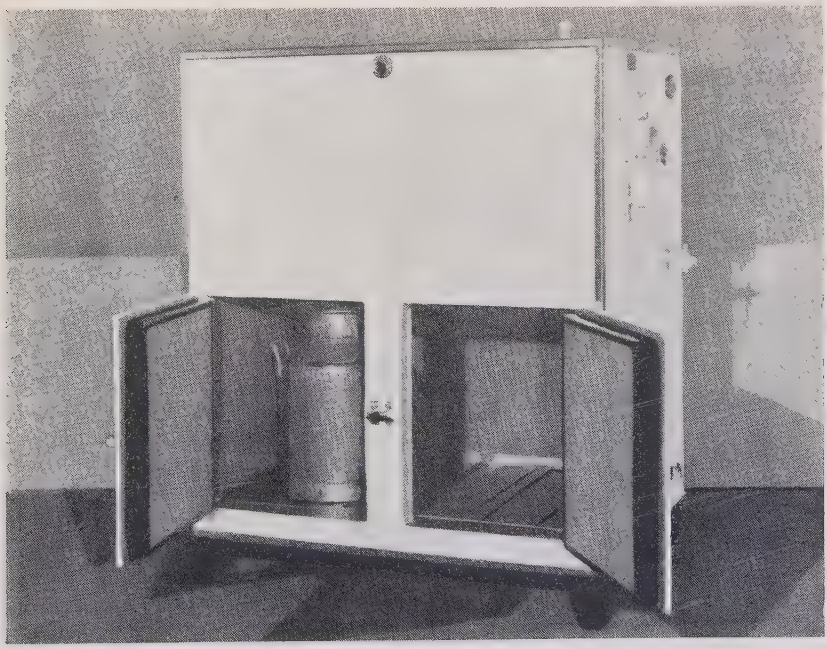

Plate 1.

Six-can Air Cooled Milk Farm Refrigerator.

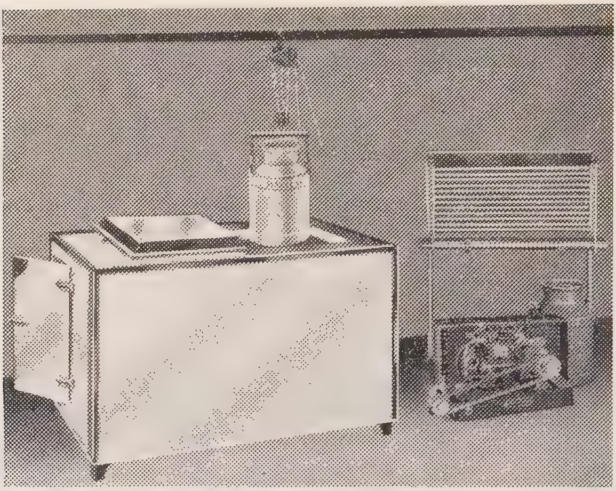

Plate 2.

Four-can Water Immersion Milk Farm Refrigerator, with Utility Section and Shock Cooler.

be asked how this sudden and general step forward came about.

The need for improved quality in summer had long been apparent to those grading the milk, for the proportion of milk meeting the required quality standard was less than half, and the task of finding satisfactory milk in summer was difficult. The cause of the poor quality was no mystery, being the 12 hours overnight storage on the farm without refrigeration, during which time the souring bacteria were able to multiply. Even milk which was produced with care, and then held overnight in summer, was unsatisfactory.

The answer was unquestionable. Nothing could keep the night's milk up to top quality but farm refrigeration. By this means alone could the milk be stored at a temperature below 40 deg. F., as is needed to stop bacteria from multiplying. Water cooling and tower cooling could reduce the temperature to 70 deg. F., but that was far short of the mark. So in order for the factory to receive a top quality raw milk for pasteurising and bottling it was essential for producers to install milk refrigerators. But how was this step to be implemented?

The course decided upon was that producing quality milk be made financially attractive, so that installing a refrigerator would become a sound economic proposition. Accordingly the Board of Directors established for milk with a methylene blue test of four hours or more a margin of 1s. 3d. a lb. butterfat above the price of unqualified milk. The financial incentive provided by the higher price for quality milk, aided by the goodwill of the producers, had the desired effect. Out of 29 farms supplying milk to the Murgon factory, refrigerators were installed on 20.

In the following summer the claims which had been made for refrigerators were substantiated. Where refrigerators were installed the proportion of milk which qualified rose to 100 per cent., whereas in summer without refrigeration the proportion of qualified milk was less than 25 per cent.

TABLE 1.

PROPORTION OF QUALITY MILK SUPPLIED.

——	Summer 1957.	Summer 1958.
	Per cent.	Per cent.
Suppliers who put in refrigerators in 1958	15	100
Suppliers who did not install refrigerators	11	22

Now farm refrigerators preserve milk quality in hot weather, and the milk delivered to the factory is top quality, which allows the factory to market top quality pasteurised milk. This progressive step to farm refrigeration was helped by providing a financial incentive.

The competitive market of today turns the spotlight on quality, and only from quality dairy products can the dairy industry look for prosperity. To preserve top quality in Queensland requires farm refrigeration, and the South Burnett Co-operative Dairy Association has demonstrated the effectiveness of a financial incentive in helping progress towards this goal.

Good-Looking Youngsters

Well-Bred Ayrshire Calves at Auchen Eden Have Their Own Paddock, Where Shade Is Provided For Them.

Herd Recording—Signpost To Success

By L. A. WILLIS, Cattle Husbandry Branch; and
K. FITZGERALD, Division of Dairying.

Herd recording results, applied to culling, feeding and calving policies, have shown two Rosewood dairy farmers the way to higher yields from their dairy herd. In four years of continuous herd recording, they have achieved a steady improvement, despite varying seasons.

Messrs. V. and N. Embrey, Tallegalla, via Rosewood, joined a Grade Herd Recording Group in 1953.

Despite the 1957 drought, they were able to maintain farm production at a high level. For the 1957-58 season, the average production per cow in their herd was 198 lb. of butterfat compared with an average of 138 lb. for the group in which their herd is recorded. They achieved this by good husbandry and farm management. Herd recording has provided the basis on which to work and measure results.

The whole herd was first recorded in 1954-55, and has now been recorded continuously for four years. The average production per cow is shown in the table:

Production figures quoted are herd recording figures, which are based on the recording season from October 1 to September 30 in the following year.

At first sight you might say that little progress has been made, since production per cow and herd numbers have not varied a great deal. But how does this record compare with the general picture in their district?

Messrs. Embrey Brothers supply cream to Booval butter factory. Here is the total butter production at that factory for the corresponding years, during which there was little change in the number of suppliers: 1954-55, 1,450 tons; 1955-56, 1,520; 1956-57, 1,184; 1957-58, 986.

Year.	Number of Cows.	Milk in Gallons.	Butterfat per Cow.	Butterfat.	Lactation Length.
			Lbs.	Per Cent.	Days.
1954–55	38	461	192	4·2	219
1955–56	37	474	211	4·5	237
1956–57	39	479	213	4·4	242
1957–58	36	429	198	4·6	265

There is a fall of 32 per cent. from 1954-55 to 1957-58; the drought was largely responsible for this. If the production on the Embrey Brothers farm had fallen to the same degree as district production, their herd average would have dropped by about 60 lb. per cow. It would have been 138 lb. butterfat instead of 198 lb.

Need for Culling

The two Embrey brothers were quick to see from their herd production figures that drastic culling was needed. Low-testing and poor-producing cows were culled heavily after the first year of recording. Without herd recording, the low testing cows could not have been identified. They are a hindrance to efficient production. Replacements are bred and reared on the property and are selected from high-producing animals. Heifers reared on the farm have been available to replace the culled cows. In this way, herd numbers have been kept at a constant level.

The herd consists mainly of Jerseys, with a few Jersey x A.I.S., and is being graded up to the Jersey breed. Herd sires are purchased from high-producing herds. Cow families are examined closely when choosing herd sires.

Having culled out the worst producers, these two Rosewood farmers realised that good producers must have a continuous supply of good feed. Once again, individual production records of the herd were used to check the response of each cow to an improved feeding system. With the "star-boarders" gone, the remaining cows had more chance to show their worth. Herd recording sorted out the better cows—those which would more than repay the cost of a suitable ration all the year round.

Plate 1.

Maize Crop with Pumpkins.

Plate 2.

Typical Section of Farm Showing Pastures and Maize Crop.

This "year-round" feed supply is based on pastures.

Paspalum, with some clover, forms the main pasture sward on the farm. In favourable seasons these pastures provide good feed through the summer months. During the autumn and winter, the nutritional level of the paspalum declines, and this deficiency has to be made up with other feed. To provide an even plane of nutrition throughout the milking season, a variety of crops is grown.

Bolstering Pastures

Under dry farming conditions, 28 acres of lucerne are grown for both grazing and hay. The lucerne is grazed during winter and also during the summer months if needed. Surplus growth during the summer is mowed and stored as hay. An area of 6 acres is sown with oats every year to provide high quality winter grazing.

Ten acres of sweet sorghum and four acres of cow cane provide bulky green feed which is chopped up and fed with lucerne chaff and grain. The sweet sorghum is fed from May to November. The cow cane is normally cut every second year from June to December, but if the season is dry and feed in short supply it is cut every year.

Maize is grown each year on about 16 acres to provide grain for feeding both cows and pigs. Pumpkins are always grown with the maize to provide extra pig feed.

Crops of Japanese millet and giant setaria are sometimes grown to provide additional feed for the summer months. If not needed for grazing, these crops are stored as a reserve of hay.

To conserve hay and grain has always been a habit of these farmers and has made a considerable contribution towards maintaining an even plane of nutrition for the cows all the year round. During the recent drought, they were able to feed continuously without buying any feed. At the commencement of the 1956-57 drought, the conserved fodder consisted of 90-100 tons of lucerne hay and 300 bags of shelled corn.

Cows are fed as much as they will eat early in the lactation, the quantity of feed being decreased as the lactation progresses. Based on total feed consumption during a lactation, an average daily ration would be approximately 28 lb. of a mixture of lucerne chaff, chopped sweet sorghum and cow cane, as well as 2 lb. of crushed maize.

Crop Rotation

This 125-acre farm is well subdivided, with 16 cultivation and eight grass paddocks. Subdivision allows for the sound policy of rotational grazing of pastures and crop rotation.

The crop rotation programme is designed to maintain soil structure and fertility. After a period of five years under lucerne, the lucerne is ploughed in the the land is sown to maize, oats and sweet sorghum for the next five years. The new lucerne is grown on an area which has just previously been under a crop of giant setaria. The giant setaria is either grazed or mown for hay depending on feed available. Sweet sorghum is never grown in the same paddock for more than two years in succession.

Embrey Brothers attribute the excellent results they have obtained from grain crops and lucerne to the regular application of fertilizer. Grain crops are fertilised with phosphatic and nitrogenous fertilizers, while superphosphate at two bags to the acre is applied to the lucerne each year.

Farm Management

Lucerne and oats are strip-grazed with the use of an electric fence to avoid wasting valuable feed.

The herd is dehorned to ensure contented animals in the milking yards, in feed stalls, and while they are strip grazing the crops.

For convenience in feeding, feeding stalls are adjacent to the hay and grain shed.

Dry stock and young heifers are grazed in well-grassed paddocks. Springing cows are run with the milking herd on good grazing for four to six weeks before calving.

Embrey Brothers have heeded the Herd Recording Branch's advice that seasonal calving makes the most profitable use of Queensland's summer pastures. Matings are controlled so that the cows start their lactations from July to September. Records show that the average lactation length of their cows has gradually increased from 219 days in the 1954-55 season to 265 days in the 1957-58 season.

Plate 3.

From the Feed Store on the Left a Central Lane Leads Through These Feeding Stalls. Cows enter the stalls from both sides.

Plate 4.

Ample Water and Shade are Aids to High Production.

Pigs provide another important source of income on this well-managed farm.

Production records show the benefits that these men have gained from applying herd recording figures to their culling, feeding, and calving programmes. With continuous recording and the continued application of production records to their breeding and feeding policies, they can look forward to further improvement in the years ahead.

* * *

SAFETY FIRST

DUE to the mechanisation of rural industry, the accident rate to workers in the agricultural and pastoral industries exceeds that in all other industries, except mining.

The majority of fatal accidents to drivers of tractors are caused by the tractor rolling on drivers or back tipping. So, be careful when working on hillsides, in ditches and on uneven country; Drive Safely. —*Industrial Safety Advisory Service, Department of Labour and Industry, Queensland.*

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Plate 1: **Feeding Time at Rocklea Pig Testing Station.**

Pig Testing at Rocklea

By F. BOSTOCK,
Senior Husbandry Officer (Pigs).

Pig testing will give the producer true facts and figures on which to base his breeding plans.

THERE is little doubt that if the pig industry is to take its rightful place in the pattern of Queensland's agriculture, something must be done to ensure the production of uniform-type pigs, reduce the present heavy breeding losses and place the industry on a sound economic basis.

Pig production has been associated in the minds of many farmers with dairying, but in latter years, with increased demand for wholemilk for human consumption and the manufacture of dried milk powder and skim-milk powder, there is a tendency to extend the industry to grain growing areas, relying on protein supplies from abattoirs and meatworks.

It is to be regretted that the industry is not given closer attention, because pig raising is a valuable adjunct to both dairying and crop growing, enabling the farmer to utilize by-products and surplus production to best advantage.

The days of "hit-and-miss" methods of building a successful industry have gone forever, and in these times of keen competition with other meat-producing industries, success can be achieved only if producers are prepared to study the demands of the consumer.

The foundations of a successful industry are uniform type and quality stock, well fed, housed and managed, and this can only be achieved, in the first instance, by careful selection of breeding stock. Too many farmers are content to use any sort of sow and very often a boar of doubtful ancestry, which reflects on the quality of the pigs forwarded to market.

Show-ring Guide

The show-ring is still our main guide to type, and unfortunately the merit of studs is assessed chiefly on the basis of awards and the high prices obtained for selected animals.

Show awards, however, do not attempt to measure the capacity of animals to transmit their carcass quality to their progeny, while prices secured are, at best, a form of advertising. Thus the major drawback of shows is that awards are made entirely on appearance and give minor non-commercial characteristics more emphasis than the production of good quality meat or the development of correct proportion of backfat and body length.

Selection of breeding stock is still made largely on appearance only, and the chances of selecting pigs which have attributes of commercial pigs are, to say the least, remote. Furthermore, there is no guarantee that such animals are capable of producing offspring which will yield carcasses suitable for present-day market requirements.

Such schemes as grading and litter recording are being used, with some measure of success, to improve breeding stock and ultimately commercial pigs, but each has its drawbacks, and circumstances arise which

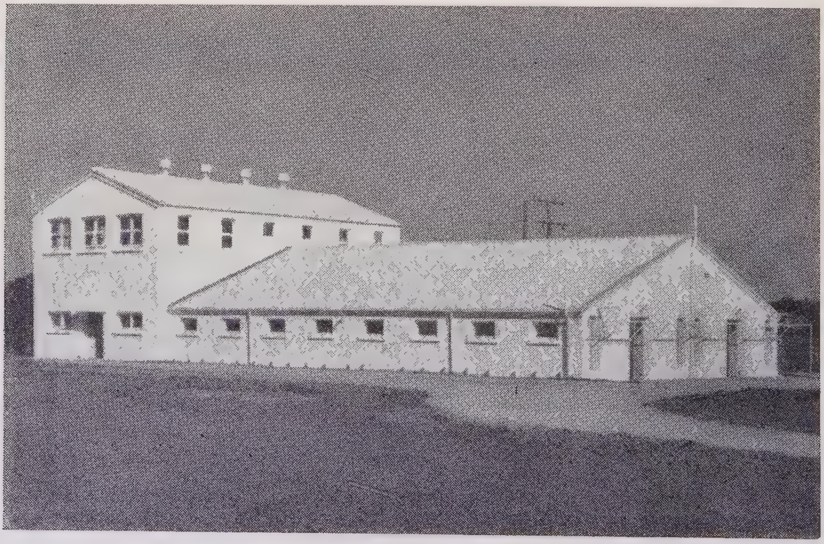

Plate 2.

Exterior of the Completed Pig Testing Station.

lead to the discontinuance of the schemes, with the result that much of the good secured, while the schemes were in operation, is lost.

As a result of this fluctuation in quality brought about by circumstances and in some cases a lack of understanding or interest, consumption of pig products slumps and the industry suffers a considerable setback, involving low prices to the producer. If, on the other hand, the quality of the product were maintained at a high level, and supply continuous, the industry would become more stable and a profitable undertaking.

Pig testing offers such a means and there is little doubt that once testing becomes properly established in Queensland there will be a marked improvement in the quality of the pigs and a big saving in production costs.

Proved By the Danes

Pig testing is not some new fantastic idea without any practical proof, because testing has been in operation in Denmark for about 50 years and the benefits which the Danes have secured in the economy of food conversion, speed of growth, improved uniformity and carcass quality are well known.

The Basic Aim of Testing

The Department of Agriculture and Stock feels that at its Pig Testing Station at Rocklea ideal conditions for testing are approached as closely as practicable, and the industry can be assured that pig testing there will be on an exceptionally sound basis.

The basic aim of testing pigs, namely, the measurement of the extent to which a boar transmits commercially important characteristics to his offspring, may be grouped under three main headings:

Characteristics primarily important to—

- (*a*) The pig producer;
- (*b*) The curer; and
- (*c*) The consumer.

Under the first heading the two main points are speed of growth and economy of food conversion. The

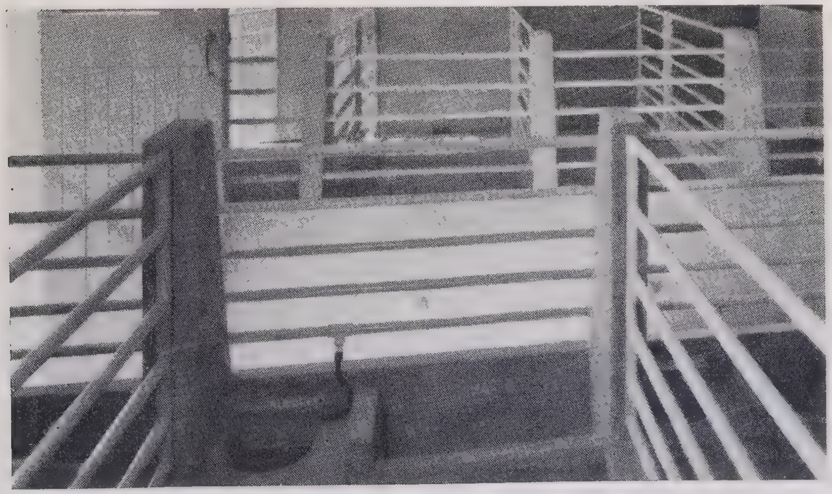

Plate 3.

Individual Pig Pens, Showing Automatic Waterer and Feed Trough.

Plate 4.
The Feed-Weighing Room.

importance of these need not be elaborated upon, but it must be pointed out that about 75 per cent. of the cost of production is represented by food, so that economy of food conversion is very important.

The second heading (*b*) applies particularly to bacon, because curers require a product which is uniform from year to year, and the retailer, quite reasonably, requires the largest possible proportion of the carcass to be in the highest priced cuts, with the right proportion of lean meat to fat and with a minimum proportion of low price cuts such as shoulders and heads.

Testing aims to do this by measuring the ratio of lean meat to fat. The importance of this balance in the carcass cannot be over-emphasised.

The third heading (*c*) refers to the modern housewife, who is mainly interested, apart from price, in the proportion of edible meat in the bacon rasher. She is not interested in fat; so testing aims to measure the amount of fat distributed throughout the carcass.

The aims of testing are to sort out those pigs and strains of pigs which are economical to the producer and at the same time satisfy the curer, retailer and consumer.

To the pig producer, one of the main advantages which testing will have over the present system of selection of breeding stock, is that it will provide authentic facts and figures upon which breeding operations may be based. This will be in place of guesswork which is the basis at present.

Pig Testing Rules

Rules that apply to the Rocklea Pig Testing Station are as follows:

1. Boars selected for testing must be standing in herds which have at least six breeding sows.

2. No certificate of performance will be given in respect of any boar until four litters sired by him out of different sows (none of which is a full sister to another) have been tested.

3. Breeders notifying their desire to have litters tested must do so two months prior to due date of farrowing. Any such litter must be the progeny of a boar and sow registered in the Australian Pig Herd Book.

4. Advice of the birth of a litter is to be given to the District Adviser (Pigs) or his agent as soon as practicable, but in any event not later than 12 hours after the birth.

5. All litters provisionally accepted for testing will be inspected and identified in an approved manner by the District Adviser (Pigs) or his agent within 48 hours after their birth. Litters will be again inspected within 24 hours of the due time of despatch of the four selected pigs to the testing station.

6. No litter will be accepted for testing which does not contain, in the case of first litter sows, seven pigs living, and in the case of sows on their second or later litter, eight pigs living, when the four test pigs are due for despatch to the testing station.

7. Litters to be tested must be not less than six weeks, and not more than nine weeks, old at time of despatch of the four selected pigs. The test pigs will comprise two castrated males and two females and each of the four must be not less than 30 lb. liveweight and not more than 40 lb. liveweight and as close to the average liveweight of the litter as possible at time of despatch. The males in a litter that are castrated (all males need not be castrated) must be operated upon when not more than five weeks old.

Plate 5.

Dust Extractor Unit, Mixing Bins, and Hammer Mill.

Plate 6.

Hammer Mill, Blower, and Grain Cyclone.

8. In special circumstances, permission may be granted for submission of uneven numbers of castrated males and females in the four test pigs.

9. One test pig may be removed from a test group on the grounds of ill health and the group allowed to continue under test but if two pigs have to be removed then the testing of the group will lapse.

10. Test pigs will be accepted only from brucellosis-tested herds and subject to a satisfactory inspection of the piggery of origin by an approved officer of the Department within 24 hours of time of despatch.

11. Test pigs will be purchased by the Department from their owners at a price per lb. liveweight to be determined from time to time according to the prevailing market, and the pigs will then become the absolute property of the Department. The liveweight on which payment will be made will be that of the pigs at time of despatch to the testing station.

12. Metal crates will be supplied by the Department for the transport of test pigs to the testing station and such transport will be the responsibility of the Department.

13. All pigs will be dewormed and sprayed upon arrival at the testing station.

14. No casual visitors or parties will be allowed to visit the testing station, but the Department will arrange inspection days at its discretion.

15. Feeding shall be twice daily and according to liveweight.

16. Any feed residue from a previous day's ration will be weighed back prior to putting out a new day's ration.

17. Testing will start as soon as pigs reach 45 lb. liveweight. The test pigs will then be weighed at seven-day intervals until they reach a liveweight of 200 lb.; they will be sent for slaughter to an approved bacon factory, where a carcass quality assessment will be made.

18. No test pigs will be disposed of in any way other than for slaughter as baconers unless so ordered by the Department.

19. All test pigs will be slaughtered, cut and trimmed by an approved standardised method and all carcasses will be assessed according to a system determined by the Department.

20. A report on the results of pig testing will be issued annually in the *Queensland Agricultural Journal* unless it should be impracticable to do so.

21. These rules may be altered or varied from time to time by the Department in the light of experience or changed circumstances.

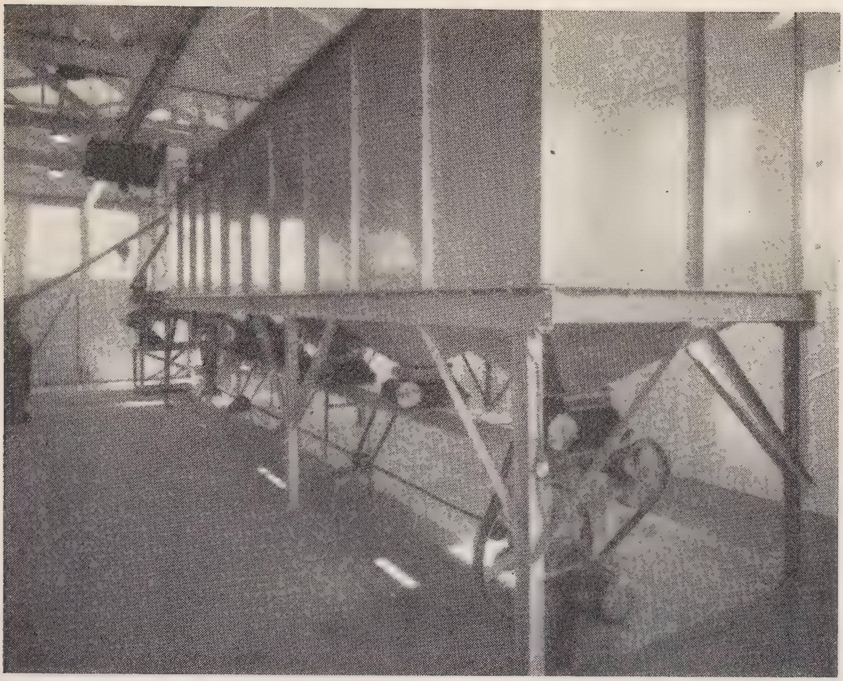

Plate 7.

Grain Storage Bins, Conveyor and Electric Hoist.

Feeding

All pigs are to be fed daily at 8.15 a.m. and 4.20 p.m. Three feed mixtures will be used and are based on the liveweight of the pigs:

Ration No. 1—*Pigs* 45–80 *lb. liveweight.*

(Mixture to contain 17 per cent. crude protein.)

Grain—90 per cent. wheat, 10 per cent. sorghum.

Meatmeal 55 per cent.—Sufficient added to provide a 17 per cent. crude protein mixture.

Mineral mixture—1 per cent. of mixture.

Vitamins A/D—100,000 I.U. of A, 10,000 I.U. of D per 100 lb. of mixture.

Riboflavin—100 mg. per 100 lb. of mixture.

Ration No. 2—*Pigs* 81–130 *lb. liveweight.*

(Mixtures to contain 15 per cent. crude protein.)

Grain—75 per cent. wheat, 25 per cent. sorghum.

Meatmeal 55 per cent.—Sufficient added to provide a 15 per cent. crude protein mixture.

Mineral mixture—1 per cent. of mixture.

Vitamins A/D—100,000 I.U. of A, 10,000 I.U. of D per 100 lb. of mixture.

Riboflavin—100 mg. per 100 lb. of mixture.

Fibre-Lucerne hay—5 per cent. of mixture.

Ration No. 3—Pigs 131–200 *lb. liveweight.*

(Mixture to contain 13 per cent. crude protein.)

Grain—50 per cent. wheat, 50 per cent. sorghum.

Meatmeal 55 per cent.—Sufficient added to provide a 13 per cent. crude protein mixture.

Mineral mixture—1 per cent. of mixture.

Vitamins A/D—100,000 I.U. of A, 10,000 I.U. of D per 100 lb. of mixture.

Riboflavin—100 mg. per 100 lb. of mixture.

Fibre-Lucerne hay—7½ per cent. of mixture.

Mineral Mixture.

50 lb.	Ground limestone
50 lb.	Fine salt
5 lb.	Ferrous sulphate
1 lb.	Copper sulphate

Note: As antibiotics are *not* to be included in the rations fed during the period of test, it is recommended that the litter from which the pigs are selected for testing should not be fed antibiotics.

* * * * *

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Saving Stock From Salmonellosis

By B. PARKINSON,
Divisional Veterinary Officer,
Maryborough.

SALMONELLOSIS (pronounced sal-mon-el-o'-sis) is an infectious disease capable of affecting domestic, as well as wild, animals and birds. Human beings may also contract the disease, the possible sources being infected or carrier animals.

The disease is really a specific gastro-enteritis, that is, inflammation of the stomach and intestinal tract. The scientific name comes from the germ *Salmonella.* There are very many species of salmonella germs, of which several are commonly encountered as causing disease in cattle and sheep in Queensland. Infection with these germs is thus the cause of the disease.

Sometimes the common names of paratyphoid, typhoid fever, "gastro" or food poisoning are given to the disease in its various forms.

The usual source of infection is a "carrier" animal, that is, an animal which has recovered from the disease but still continues to discharge the germs. The introduction of a carrier animal into a clean herd or flock often causes an outbreak of disease. The germs inhabit the bowels of carrier animals, and all droppings are heavily infected. Contamination of the surroundings, including food and water, readily leads to infection of susceptible animals, especially where other factors favour an outbreak.

It must be remembered that salmonella germs are not specific for any one species of animal. Introduction of one species of carrier animal may readily cause disease in other species. Thus carrier pigs (and paratyphoid is very common in pigs) may be the source of infection of cattle.

Vermin, such as rats, mice, and cockroaches, are known to harbour the germs. It is suspected that many outbreaks, particularly in dairy cattle, have been caused through vermin contamination of feed. This can be understood when one considers the manner in which feed sheds, both commercial, and on the property, are open to vermin contamination.

Conditions.

Most animals have a certain amount of resistance to most diseases. It is only when the germs are too numerous, or the animal's resistance is lowered, that sickness may occur.

This applies to salmonellosis, and is particularly well seen in the case of dairy cattle. The disease in dairy cattle seems to occur mostly in winter months. The animal's resistance is lowered because of the cold, more so if it is wet. Hand-feeding with concentrates is more common during the winter. Hence exposure to source of infection, that is, contaminated feed, is more likely to occur. These factors are believed to be responsible for the many outbreaks seen in a district like Gympie each winter.

Outbreaks of salmonellosis may occur during, or after, rail travel. Cases have occurred in cattle and horses, but outbreaks are more frequent in sheep. Several factors would appear to be related to such outbreaks as follows:

(1) Fatigue during the journey lowers resistance.

(2) Infection may be readily acquired at spelling yards through contaminated feed or water. Infection could spread further in the trucks after reloading.

(3) Feeding routine before and during the journey.

(4) Starvation, which may allow salmonella germs present in the intestines to multiply and invade the body, and which also lowers resistance.

In sheep the disease is commonly encountered at local slaughter-yards or off trucks. The usual practice in non-sheep districts on the coast is to purchase at one time sufficient sheep to kill over several weeks. Sometimes these sheep have travelled hundreds of miles and may have been exposed to infection at trucking or sale yards. It is not uncommon to find sickness in some batches of sheep on, or shortly after, arrival.

Salmonellosis has also been diagnosed as the cause of sickness and deaths in valuable rams or ewes transported from southern States to Queensland. Here diet is thought to be of prime importance. Usually the sheep have been on prime, succulent feed before their departure. The paunch of a sheep fed thus soon empties when the sheep is in transit. Appetite is only slowly regained. During spells, usually hay only is offered and the sheep have little appetite for this. This chain of circumstances seems to be a major factor in the onset of sickness.

Symptoms.

Infection usually takes place through the mouth, by swallowing contaminated feed or water. The germs lodge in the bowels and rapidly multiply. They may spread via the blood stream to other organs and multiply to such large numbers that the body defences are overwhelmed. Sudden deaths, with no prior symptoms, occur under these circumstances.

More often the course of the disease is protracted, during which time the germs damage the intestines. The most marked symptom is severe scouring. Mucus and even shreds of the lining of the intestinal wall are often seen in the scour. Blood is sometimes seen. The scour is particularly foetid.

Affected animals are dull. Appetite is lost, and, in milking cows, production drops off. Condition is rapidly lost—a prime beast may become poor in several days.

Initially there is a high fever—up to 105–106 deg. The temperature usually drops when scouring is severe, and may be between 103–104 deg F. Some cases with severe scouring may have normal or subnormal temperatures.

Death in most cases may occur in 2–7 days. Some cases may recover without treatment. They may scour for several weeks, and take many weeks to regain their condition.

Many recovered cases act as carriers of the germs, to infect other animals.

The post mortem changes are not very definite. The wall of the fourth stomach and intestines show severe inflammation, being more pronounced in the small bowel. Ulceration, and in severe cases, loss of the mucous lining may have occurred. Haemorrhages may appear under the lining of some of the body organs. The spleen may be swollen and somewhat pulpy.

Diagnosis.

Are these symptoms and post mortem findings the signposts of salmonellosis?

Other infections, such as coccidiosis and so-called "winter dysentery" produce similar symptoms. Worm infestation must also be considered. Poisoning, particularly arsenical and several irritant plant poisons, also cause much the same symptoms.

It is often difficult to be absolutely certain. Previous history must be taken into account. The presence of a fever is usually indicative of infectious disease. Poisoned stock seldom show fever. Thus the use of the ordinary clinical thermometer in taking the animal's temperature can provide a valuable aid to diagnosis.

Laboratory confirmation of diagnosis is most reliable. The germs in fatal cases can be readily found. Quite often it is possible to detect the germs in faecal samples from live animals exhibiting symptoms.

Modern Treatment.

Modern medicine has advanced a long way in the treatment of this condition in the past few years. Various drugs are available for treatment. As with all diseases, the length of time the beast has been affected before treatment commences is of prime importance in forecasting favourable results. Cost may be a governing factor in choosing some of the more effective forms of treatment. Ultimate choice depends upon the value of the animal.

Sulphonamide drugs, chiefly sulphadimidine, have been most useful in the past, and have the advantage of low cost. However, they are not always effective, particularly in advanced cases. The drug is best administered by using the 33⅓ per cent. solution, 100 ccs. (for an adult cow) being given daily for 3 to 4 days as an injection under the skin. For sheep, a daily dosage of 1 cc. for every 5 lb. live weight is used for 3 to 4 days.

The group of antibiotics known as tetracyclines are much more efficient, as is also another antibiotic, chloromycetin. Some are available as powder for dosing by mouth and some for injection purposes. The enonomic factor is obviously one of considerable importance here. A cost which can be reasonably sustained in the case of a stud bull would be prohibitive in flock sheep. The injectable form of antibiotics such as oxytetracycline (terramycin) or chloromycetin, are usually more effective, but more costly than types for oral use.

It is emphasised that the ultimate treatment of choice can only be determined according to the case. Veterinary surgeons or stock inspectors are best consulted before adopting any treatment.

To Prevent Outbreaks.

Preventive measures readily follow from an understanding of the conditions which favour the development of the disease. Avoiding the contamination of feed and water by vermin or infected or carrier stock is of prime importance. Any positively affected beast in a mob must be isolated to prevent further spread.

Feeding of travelling stock before departure must be considered. Instead of lush grazing, fibrous fodder such as cereal or lucerne hay, should be fed for several weeks before transit. Travelling stock should be spelled adequately and fed mainly roughage. Troughs and water facilities at trucking and spelling yards must be clean.

Public Health.

Because salmonella germs can infect humans, personal hygiene must be observed after handling affected animals. The germs can also cause a type of food poisoning. There is a danger to public health from the slaughter and sale of infected cattle or sheep at slaughteryards or abattoirs during an outbreak. Some carcasses may be affected. Fortunately, State slaughtering inspection services minimize the risk of carcasses likely to cause trouble being exposed for sale.

Brucellosis-Tested Swine Herds

(As at 1st April, 1959.)

Berkshire.

S. Cochrane, "Stanroy" Stud, Felton
J. L. Handley, "Meadow Vale" Stud, Lockyer
O'Brien and Hickey, "Kildurham" Stud, Jandowae East
G. C. Traves, "Wynwood" Stud, Oakey
Westbrook Farm Home for Boys, Westbrook
H.M. State Farm, "Palen" Stud, Palen Creek
A. R. Ludwig and Sons, "Beau View" Stud, Beaudesert
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
R. H. Crawley, "Rockthorpe" Stud, *via* Pittsworth
F. R. J. Cook, Middle Creek, Pomona
Mrs. I. M. James, "Kenmore" Stud, Cambooya
H. L. Stark, "Florida," Kalbar
H.M. State Farm, Numinbah
G. L. Gabanko and R. H. Atkins, "Diamond Valley" Stud, Mooloolah
L. Puschmann, "Tayfeld" Stud, Taylor
C. E. Edwards, "Spring Valley" Stud, Kingaroy
V. F. Weier, "La Crescent," Clifton
N. Rosenberger, "Nevrose," Wyreema
L. P. Orange, "Hillview," Flagstone Creek
W. Young, Kybong, via Gympie
E. J. Clarke, Mt. Alford, *via* Boonah
G. McLennan, "Murcott" Stud, Willowvale
C. F. W. and B. A. Shellback, "Redvilla" Stud, Kingaroy
J. C. Lees, "Bridge View" Stud, Yandina
F. Thomas, "Rosevale" Stud, M.S. 373, Beaudesert
A. C. Fletcher, "Myola" Stud, Jimbour
Q.A.H.S. and College, Lawes
E. F. Smythe, "Grandmere" Stud, Manyung, Murgon
E. R. Kimber, Block 11, Mundubbera
A. J. Potter, "Woodlands," Inglewood
Regional Experiment Station, Hermitage
J. W. Bukowski, "Secreto" Stud, Oxley
R. Astbury, "Rangvilla," Pechey
L. Pick, Mulgildie
D. G. Grayson, Killarney
A. French, "Wilson Park," Pittsworth
P. L. Pfrunder, Pozieres

Large White.

H. J. Franke and Sons, "Delvue" Stud, Cawdor
Garrawin Stud Farm Pty. Ltd., 657 Sandgate road, Clayfield
J. A. Heading, "Highfields," Murgon
R. Postle, "Yarralla" Stud, Pittsworth
E. J. Bell, "Dorne" Stud, Chinchilla
L. C. Lobegeiger, "Bremer Valley" Stud, Moorang, *via* Rosewood.
H. R. Gibson, "Thistleton" Stud, Maleny
H.M. State Farm, Numinbah
S. T. Fowler, "Kenstan" Stud, Pittsworth
W. Zahnow, Rosevale, *via* Rosewood
Regional Experiment Station, Biloela
G. J. Hutton, "Grajea" Stud, Cabarlah
H. L. Larsen, "Oakway," Kingaroy
A. Palmer, "Remlap," Greenmount
G. I. Skyring, "Bellwood" Stud, *via* Pomona
G. Pampling, Watch Box road, Goomeri
M. Hall, "Milena" Stud, D'Aguilar
K. B. Jones, "Cefn" Stud, Pilton road, Clifton
Barron Bros., "Chiltern Hill," Cooyar
K. F. Stumer, French's Creek, Boonah
Q.A.H.S. and College, Lawes
R. S. Powell, "Kybong" Stud, Kybong, *via* Gympie
C. Wharton, "Central Burnett" Stud, Gayndah
S. Jensen, Rosevale, *via* Rosewood
V. V. Radel, Coalstoun Lakes
H. R. Stanton, Tansey, *via* Goomeri
L. Stewart, Mulgowie, *via* Laidley
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
O. J. Horton, "Manneum Brae" Stud, Manneum, Kingaroy
Dr. B. J. Butcher and A. J. Parnwell, 684 Logan road, Greenslopes, Brisbane
R. Kennard, Collar Stud, Warwick
A. C. H. Gibbons, Mt. Glorious
A. Kanowski, "Exton," Pechey
L. C. and E. Wieland, Lower Cressbrook
P. L. and M. T. D. Hansen, "Regal" Stud, Oaklands, Rangeville, Toowoomba.
J. C. Lees, "Bridge View" Stud, Yandina
C. Assenbruck, Mundubbera
A. J. Mack, Mundubbera
J. & S. Kahler, East Nanango
C. P. Duncan, "Hillview," Flagstone Creek

Tamworth.

D. F. L. Skerman, "Waverley" Stud, Kaimkillenbun
A. C. Fletcher, "Myola" Stud, Jimbour
Salvation Army Home for Boys, "Canaan" Stud, Riverview
Department of Agriculture and Stock, Regional Experiment Station, Kairi
T. A. Stephen, "Withcott," Helidon
W. F. Kajewski, "Glenroy" Stud, Glencoe
A. Herbst, "Hillbanside" Stud, Bahr Scrub, *via* Beenleigh
F. Thomas, "Rosevale" Stud, M. S. 373, Beaudesert
H. J. Armstrong, "Alhambra," Crownthorpe, Murgon
R. H. Coller, Tallegalla, *via* Rosewood
D. V. and P. V. Campbell, "Lawn Hill," Lamington
S. Kanowski, "Miecho" Stud, Pinelands
N. R. Potter, "Actonvale" Stud, Wellcamp
L. C. and E. Wieland, Lower Cressbrook
J. D. Booth, Swan Ck., Warwick

Wessex Saddleback.

W. S. Douglas, "Greylight" Stud, Goombungee
C. R. Smith, "Belton Park" Stud, Nara
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
J. B. Dunlop, "Kurrawyn" Stud, Acacia road, Kuraby
M. Nielsen, "Cressbrook" Stud, Goomburra
G. J. Cooper, "Cedar Glen" Stud, Yarraman
"Wattledale" Stud, 492 Beenleigh road, Sunnybank
Kruger and Sons, "Greyhurst," Goombungee
A. Scott, "Wanstead" Stud, Grantham
G. C. Burnett, "Rathburnie," Linville
A. J. Mack, Mundubbera
J. Ashwell, "Greenhill," Felton South

Large Black.

E. Pointon, Goomburra

Stock and Station

THE grazier who is breeding beef cattle always seeks to increase the source of his main return, that is, the number of calves born and reared each year.

These tips on mating methods will help to raise the calving percentage—if you are in a position to undertake them.

Firstly, in mid-summer, bring the breeders into a comparatively small paddock. There's plenty of grass then, so the temporary heavy stocking won't do any harm and the cows will be found easily.

Then try putting out the bulls in two or three batches—say at intervals of two weeks. This gives a percentage of fresh bulls over the main mating period.

Avoid using all young, first-year bulls or all old bulls. Aim at a balanced proportion of first-year, medium age and older bulls. Use between three and five bulls for every 100 cows.

Finally, avoid overfatness in heifers, if possible, as it is one cause of a low calving rate in this class of animal.

—*W. F. MAWSON,*
Senior Adviser in Cattle Husbandry.

BENZENE HEXACHLORIDE (BHC) still has wide use as a tickicide. Like DDT, it is practically insoluble in water and its effectiveness in a dip depends on its proper dispersal in the water. Stirring, first with a shovel and then with a metal stirrer, should be carried out before stirrer cattle are put through the dip. Samples collected immediately after dipping has been completed should be sent regularly to the Animal Research Institute, Yeerongpilly, for analysis.

In a dip, the recommended concentration of BHC is 0.05 per cent. of the gamma isomer. This represents a concentration of approximately 0.5 per cent. of most commercial preparations. There's evidence that some ticks have become resistant to BHC. But don't be too hasty in blaming the BHC preparation for poor results in tick control when improper management of the dipping vat may be the real cause.

—*S. G. KNOTT,*
Divisional Veterinary Officer.

IF your pigs rub and scratch excessively, it's quite likely that sarcoptic mange has got into your piggery. This disease is caused by a mite that burrows into the pig's skin, causing intense itching and worry. Affected pigs take longer to make weight gains than healthy ones.

Mange often starts on the head and spreads over the rest of the body. The skin becomes dry and scurfy, and may wrinkle; hair falls out and raw patches may develop from rubbing.

BHC is recommended to cure mange. Treat affected pigs by spraying or dipping, using a 0.25 per cent. gamma BHC solution. In badly affected pigs, several follow-up treatments may be necessary. In spraying pigs, crowd them together so that they rub the preparation into each other.

—*S. G. KNOTT,*
Divisional Veterinary Officer.

EVERY year quite a lot of sickness amongst pigs occurs because of cold, wet floors. Our ideas on pig shed flooring have changed; wood is now considered unsatisfactory except for certain conditions. Boards absorb moisture, and are cold and slippery when wet. Disease organisms flourish in the moist surface layers.

Solid concrete floors don't have the slippery surface common with wood, and are easier to clean. However, these solid floors soon become damp and cold in the wet season, and pigs sleeping on them may develop pneumonia.

Best of all is the hollow concrete floor. One way of building it is by placing empty bottles flat on the prepared site, about 1 in. apart. The spaces between the bottles are then filled with concrete, and a layer not more than ¾ in. thick is placed over them.

This floor is warmer and drier than others, even without bedding, and is ideal for sow and litter or weaner pens. It reduces losses due to cold damp floors, and is relatively cheap to construct.

—*T. ABELL,*
Senior Adviser, Pig Branch.

Timely Tips For May

IT'S worth considering a strategic drench for worms in May. Whatever species of animals you have, may benefit from a drench this month to send them into the winter with a lighter burden of worms.

Many new drenches are on the market for different species of worms. This is the result of research work done in the last few years. You would be wise to discuss these drenches with your veterinary surgeon before deciding which one to buy.

Watch the food supply of "in lamb" ewes this month. A fall-off in food for these animals can trigger off pregnancy toxaemia. Symptoms of this disease are similar to "milk fever," but give no response to calcium injections.

Careful observation of the flock will reveal ewes showing symptoms while still on their feet. Drenching with glycerine or sugars before they go down is worthwhile. Once ewes are on the ground there's not much hope of treating successfully.

The real answer to pregnancy toxaemia is to make sure the feed is good through the pregnancy—and handle pregnant ewes carefully!

In the Upper Maranoa, Upper Burnett areas and Springsure areas, an increase in sawfly larvae in May might point to danger in June or July.

Have swellings in the scrotal region of pigs investigated. They may be hernia or infections from castrations. You can do something about both.

Distemper in dogs is always present in cities. In the country, it often runs through dogs as an epidemic in late winter. Now may be the time to have your dog immunised. In the bush, group vaccination is the shot. Get together with your neighbours and your local veterinary surgeon and organise a "distemper day."

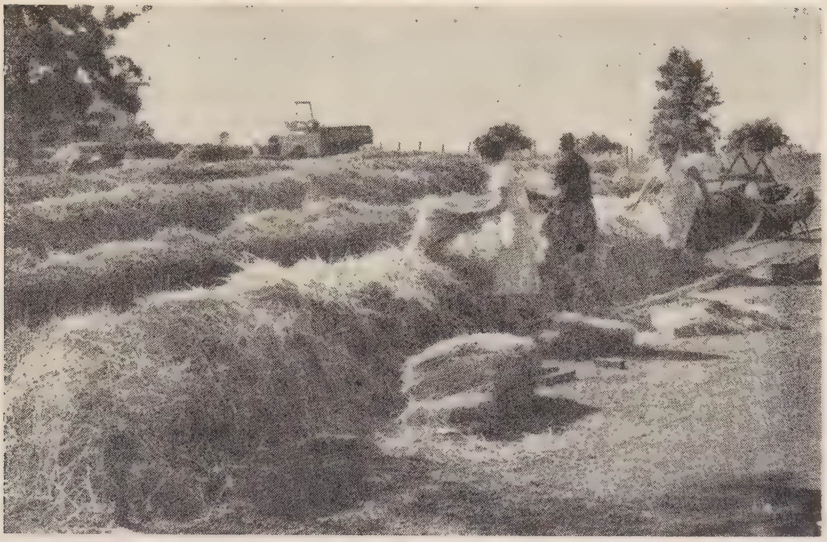

Plate 1.

Outdoor Ridge Beds. Hessian and straw are being used to shelter the beds until the spawn grows through the compost. Beds in the far-background have been covered with casing soil and straw some time ago and are producing mushrooms.

Growing Mushrooms In Queensland

By G. J. P. McCARTHY,
Pathologist.

Because many difficulties lie in the path of the inexperienced mushroom grower, beginners should proceed on a small scale until they have gained proficiency.

The practice of gathering spawn of the edible mushroom (*Agaricus campestris*) from the field and planting it in prepared compost seems to have arisen in the seventeenth century. By this means, erratic crops of edible fruiting bodies were produced. Over the years, methods of culture have been gradually improved and strains of the mushroom have been selected for their desirable qualities. In more modern times, it has been customary to prepare these selected strains as pure culture spawn so that they are free from contaminants and undesirable forms.

Most areas in Queensland have a winter climate which is ideal for mushroom culture. Special houses and equipment are not needed and do not add much to the chances of success. On the other hand, the heat and heavy rainfall of the summer are two disadvantages which increase the cost of production in this season because expensive structures are necessary to provide the required conditions for maintaining growth at this period.

Normally in south-eastern Queensland, composting should not commence until April when the worst of the hot, wet weather is over, and should cease in July so that the cropping period of the mushrooms does not extend into the following summer. With experience, growers in cool locations or with refrigerated sheds may be able to extend the growing season beyond these months.

Mushroom culture may not be difficult for an experienced producer but there are many pitfalls for the inexperienced. The prospective grower should therefore commence production on a small scale until he has acquired the necessary skill. The beginner will benefit greatly by keeping records of such things as compost preparation, casing soils, crop management and production, and the times involved in each operation. These details will form the basis for increasing efficiency later.

PREPARING THE COMPOST

The compost should be prepared in a place where it can be protected from cooling and drying winds, from heavy rain, and from any surface water. However, any protective structures should still allow plenty of air to circulate around the heap, as aeration is essential for composting.

A concrete floor can be easily cleaned and forms the best base for composting. If the compost is prepared on soil, it is necessary to sterilize the soil to free it of pests, diseases, and weeds. Commercial formalin diluted at the rate of 1 part to 50 parts of water can be used for this purpose. The solution is watered on the soil until it is wet thoroughly for a few inches down. The area is then covered with wet bags for two or three days after which it is aired until the smell of the formalin has disappeared.

The best materials for preparing the compost are horse manure and wheat straw. For every 3 volumes of horse manure there should be 7 volumes of straw. If only old, poor-quality horse manure is available, a greater quantity will be needed.

Other manures (such as fowl, cow, or sheep manures) can be used. The volume should be halved for fowl manure. Other types of straw beside wheat straw can be used but a material which will remain open and not become greasy and soggy should be selected.

If the manure and straw must be kept before they are used in the compost, they should be dry and piled high so that they remain reasonably dry even if some rain falls on the heaps.

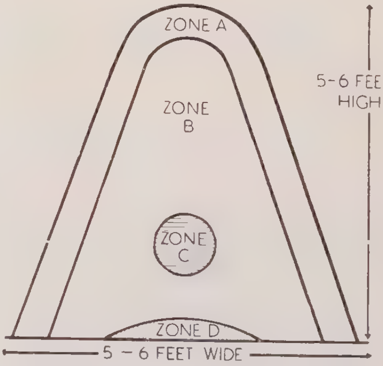

Plate 2.

Cross Section Through a Compost Heap Indicating the Dimensions of a Heap and the Zones of Different Composting Action. Zone A: Temperature is 120 deg. F. or less; conditions are aerobic. Zone B: 120 deg. F. to 140 deg. F; aerobic; this is a zone of most favourable composting. Zone C: 140 deg. F. or more; aerobic; present if heap is too wide and dense. Zone D: 120 deg. F. or less; anaerobic insufficient aeration); present if heap is too wide.

Compost Heaps

The compost heap should be long (a minimum of 6ft.) and narrow. The width of the heap may be varied to suit different materials and climates. A narrower heap should be made with compacted (poorly ventilated) compost than with loose (well ventilated) compost. Also the heap should be made wider if it is not well protected from cold westerlies or if the weather is very cold.

The materials for the compost are mixed evenly and piled into a heap of the shape shown in Plate 2 (a moveable frame can be used to shape the sides of the heap). It is better to prepare two heaps rather than have one made of different composting materials. As the heap is prepared it should be given as much water as possible before the first turning, but not so much that water runs through the heap. This is better than watering too lightly at first and having to give large quantities of water near the end of the composting process. The condition to be aimed at is described later under characteristics of a good compost.

It will be found that fresh, unused straw is difficult to wet. This straw can be wet before it is mixed with the manure and even then several shortly spaced turnings of the heap may be required before sufficient water has been absorbed by the materials in the compost.

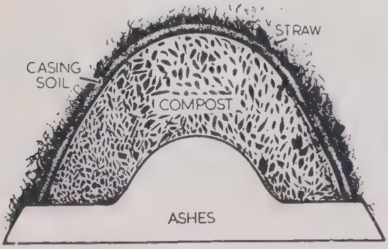

Plate 3.

Cross Section of a "Ridge Bed."

Plate 2 indicates how a number of zones with different composting action can occur in the compost heap. For preference the heap should be turned so that material in Zones A, C, and D will be placed in the area of Zone B in the reconstructed heap. However, growers should construct their heap so that overheating or anaerobic composting (Zones C and D) are absent or at a minimum. With experience this is easily achieved and the heap may then be turned in a random manner either mechanically or by hand and still compost satisfactorily.

The grower should make a record each day of temperature of the heap at various distances from the outside. Plate 2 depicts the zones of different temperatures and composting actions to be found. The heap will be ready for turning after the gradual settling of the heap has slowed down and the temperature of Zone B has fallen to near 120 deg. F. The period before the first turning is usually the longest and may be as long as seven days. The final turn may be due only three or four days after the previous turn. During turning, any lumps in the compost must be broken up and any dry areas must be watered lightly. Usually four or five turnings and three weeks of composting are needed before the compost is ready to go into the beds. However, it is important to realise that unnecessarily prolonged composting will reduce the food value, the texture, and the yields expected of the compost.

If good composting does not commence before the first turning, further manure should be added during the turning. Fowl manure is excellent for this purpose.

Other substances which should be added to the compost are as follow:

(1) 20-25 lb. powdered gypsum per ton of compost added evenly when the heap is first being made or during

Plate 4.

First Turning of a Compost Heap on Mr. R. Bacchi's Mushroom Farm at Zillmere. A fork lift on the tractor is being used to prepare the new heap on the left from the heap on the right.

the first turning to improve the structure of the compost.

(2) 3 lb. of 10 per cent. benzene hexachloride dust to each ton of compost added evenly during the last turning of the compost. (A light dusting of this insecticide can be given to the outside of the heap after the last turning.)

(3) Up to 10 lb. of powdered superphosphate to each ton of compost may be added evenly when the heap is being prepared if the manure is of poor quality. Fowl manure or good quality horse manure should have sufficient phosphate, and the addition of superphosphate to these may even reduce yields.

(4) Some growers have experimented with synthetic materials such as urea and nitrogen fertilizers which can be used instead of, or to supplement, their other manure supplies. Generally the quantities needed for one ton of compost, if no manure is used, are of the order of 60 lb. urea, 15-25 lb. potassium chloride, 30 lb. gypsum and 200-400 lb. of some type of grain. If half the required manure is available, these fertilizers are reduced accordingly. However, use of these materials gives the grower new problems. For example, the addition of too much nitrogen will reduce yields.

As a guide when making these additions, a grower can estimate that a ton of freshly assembled compost will have a capacity of approximately 2½ cu. yd. It should be remembered that this amount of compost will lose some of its bulkiness and will be sufficient for only from 60 to 70 sq. ft. of mushroom bed prepared 6 in. deep.

Good Compost

The characteristics of a good compost are:—

(*a*) The foul, ammoniacal odour characteristic of fresh manure should be no longer present. (By this time the alkalinity should be down to a measurement of 7.5 to 8.0 on the "pH" scale.)

(*b*) The compost should be a chocolate-brown colour, slightly speckled with white. The straw should have lost its bright yellow colour.

(*c*) Straws should be soft and pliable. It should be possible to tear them rather easily, indicating that the fibres have partly disintegrated.

(*d*) The compost should hold its shape when pressed into a ball and yet should break up easily again. Although the moisture from a piece of compost should wet the hand when it is squeezed, water should not run away. The compost should be open and not heavy and greasy.

(*e*) About 1 ft. from the outside of the heap, there should be an area in which the straw appears to be flecked with a powdery, whitish flour. This is called "fire-fang" and is due to the presence of an organism which requires good aeration, a temperature of from 110 deg. F. to 140 deg. F. and moderate dryness. Excessive fire-fang indicates that the compost may be a little too dry.

GROWING SITES

Mushrooms grow best under controlled conditions. Special mushroom houses with wooden trays in tiers are often used by the large growers. However, many local growers have found it expedient and economical to have the beds in the open. Others have beds in a variety of places such as under houses or in disused sheds. The beginner or the small grower would be unwise to construct expensive houses.

Outdoor Beds

Outdoor beds are called "ridge beds" and should be raised off the

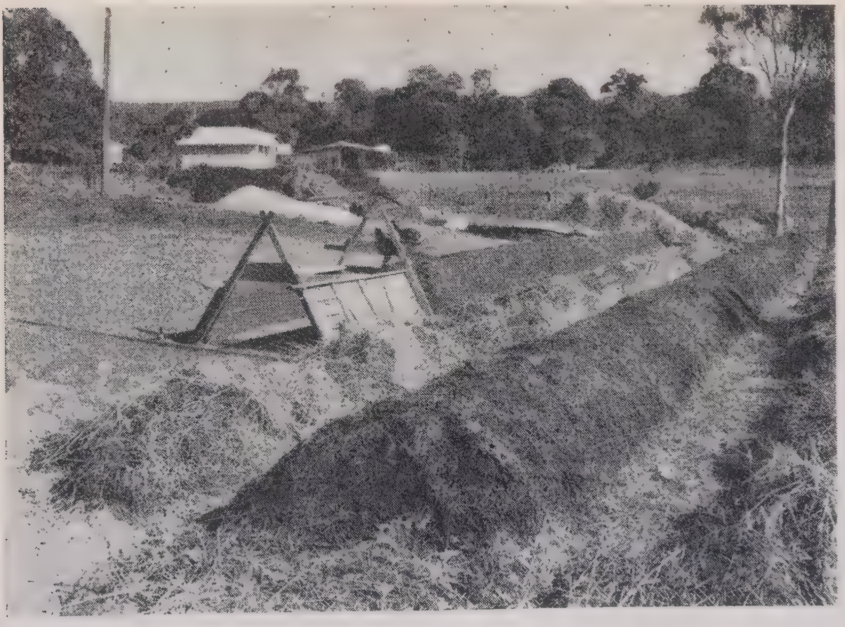

Plate 5.

Outdoor Ridge Beds. Mushroom spawn has just been planted in the far bed. Spawn has grown through the compost in the near bed which is due to be covered with casing soil.

Plate 6.

Outdoor Bed. Here straw has been attached to a movable hessian roof.

ground. A few inches of ashes will protect them from the majority of contaminants from the ground and from any flowing water. Beds are about 3 ft. wide and 2 ft. high and ashes are heaped in the centre (Plate 3) to avoid an excessive depth and waste of compost in the centre of the bed. On top of the ashes is placed the compost which should form a semicircular heap and be firmed down well. Spawning and covering with casing soil is carried out as described for indoor beds.

A loose covering of fresh straw at least 3-4 in. deep is placed over the ridge beds and watered frequently to maintain the desired humidity on top of the casing soil. The beds should be situated so as to be sheltered from cold, dry, westerly winds. Even in sheltered positions, the straw can dry rapidly, and watering two or three times a day is often required. The straw protects the beds from light rain, but if prolonged wet weather occurs further protection will be necessary.

If the straw cover for the beds is attached to a frame instead of being heaped loosely on the surface of the bed, there are obvious advantages. Firstly, the beds can be exposed more quickly for operations such as watering of the casing soil (an operation performed at approximately three to four day intervals), inspecting the maturity of the crop, checking for and control of pests, and picking the crop. Secondly, the beds can be made on a wider base with a more level and wider upper surface. The frame holding the straw can be erected at an angle steep enough to shed rain even while the mushroom bed below is almost flat.

Indoor Beds

Sheds used for mushroom culture should provide good insulation. Walls made from breeze blocks are excellent but many other materials are suitable. A ceiling with good space between it and the roof helps insulate and ventilate the shed. Also the ceiling prevents condensation from the inside of the roof dripping on to the top bed. Hinged flaps in the ceilings and on the end walls (both above and below the ceiling) should be provided but situated so that there are no draughts on any of the beds to dry them out. It is advantageous to have the sheds made so that the walls are shaded from the sun, particularly during the afternoon. The floor of the shed should drain well.

Preparing Trays

Indoor mushroom growing is usually carried out in trays. If these are about 4 ft. wide they can be conveniently handled. To utilize the space fully, the trays should be in tiers but the lowest tray should be from 6 to 12 in. from the floor to avoid the excessive moisture and foul air which often collects on the ground.

The sides of the trays should be at least 7 or 8 in. high. If the bottom of the trays is made of slats and is removable, the spacing between the top of one tray and the bottom of the one above it need only be 18 in. However, if the shelving on the bottom of the trays is fixed, a space of 24 in. will allow easier filling with compost. The side boards of the trays should be removable so that the spawn can be examined periodically as it grows.

The compost should be spread evenly in the trays to a depth of 10 in. and then pressed down firmly with a piece of wood to leave a depth of about 6 in. The temperature of the compost should then rise slightly and only when it has fallen again should the spawn be added to the bed.

If the compost is very dry, a very small quantity of water can be added before spawning. It is necessary to water as lightly as possible and repeat the watering if necessary. The spawn will not grow in a compost which is too moist.

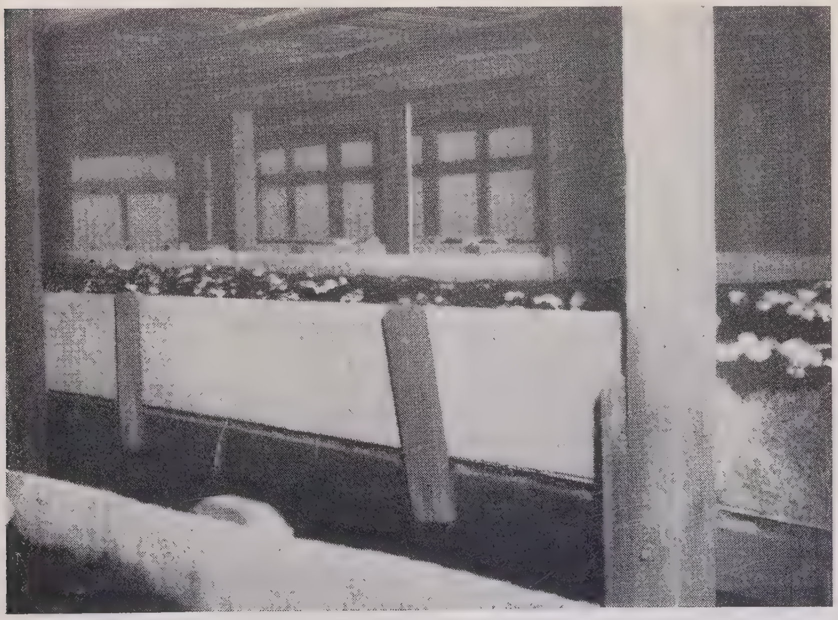

Plate 7.

Tiers of Indoor Beds. The side walls and bottom of the trays are made from sheets of fibro and are easily removed (see to right of post).

If a shed is used for the cultivation of mushrooms it should be sterilized between crops. The simplest way to do this is to spray the inside of the shed with commercial formalin solution diluted at the rate of 2 gal. of formalin to 100 gal. of water. This spray is rather irritating to the operator and the parts of the shed farthest from the door should be treated first. The trays should receive particular attention. Immediately after spraying, the shed should be closed for two days and then ventilated until the formalin has escaped.

SPAWNING

The spawn commonly used in Queensland is pure culture "grain" spawn which is grown on wheat grain in bottles or similar containers under sterile conditions to protect it from moulds and pests. Once the spawn is removed from the bottles, it will deteriorate rapidly. The spawn is damaged by temperatures exceeding 90 deg. F. and for this reason 80 deg. F should be the absolute maximum temperature of the compost beds when spawn is added. A temperature of 75 deg. F. is more desirable.

Holes are dug into the compost from 10 to 12 in. apart and from 5 to 6 in. from the sides of the beds. These holes should be 2 in. deep so that the spawn will receive adequate moisture. In very moist compost the holes can be shallower. A heaped teaspoonful of grain is adequate for each hole and a quart of grain spawn should be sufficient for 100 sq. ft. of bed of good compost. If the quality of the compost is in doubt, the holes could be spaced more closely and the spawn used more heavily.

After spawning, a sudden drop in temperature will slow down spawn growth. The spawn should grow through the compost in three weeks if the temperature is allowed to drop gradually to 60 deg. F. Inspection can easily be made if the side boards of the trays are removable. There is likely to be some loss of moisture from the compost while the spawn is growing and the beds should be covered lightly with sheets of paper. These should, however, not be packed on tightly enough to exclude air.

THE CASING SOIL

After spawning, the bed should be covered with 1½ in. of moist, loose casing soil which, when pressed down firmly must have a uniform depth of 1 in. A good casing soil must absorb water readily and must not cake or go lumpy. It must be capable of holding a reasonable amount of water. These requirements are filled by a dark clay loam or loam which has a high organic matter content, and good structure. Soils with low organic matter content should be tried on a few small areas before being used extensively.

It is preferable to select the soil from virgin land and not from a field which has been continuously cultivated.

The physical and not the nutrient properties of the soil are important. It may be best for a start to test in different mushroom beds several soils which fulfil the requirements. The most suitable can then be chosen for future use. The soil should be screened through a 1 in. screen after it has been broken into a loose, friable, moist condition.

Most soils available for casing the beds are acid and must be neutralized with powdered limestone. The limestone used should have a low magnesium content. Most growers aim for a pH of 7 (neutral point). A guide to the amount of lime required is that 4 lb. of limestone will raise the pH of a cubic yard of an average soil from 6 to 7. It will be necessary to test the pH of the soil before, and some weeks after, adding the lime. Checking the acidity of the soil cannot be carried out immediately after the lime is added because a delay of four to six weeks is often necessary before neutralization is completed.

When the acidity has been corrected, the soil should be spread less than 1 ft. deep on a hard, level surface and sterilized by wetting with 2 per cent. formalin (made by adding 1 part of commercial formalin to 50 parts of water). Wet bags should be immediately laid over the soil and left for three days before removing. The soil should then be left uncovered until the smell of the formalin has disappeared. This may take 10 to 14 days.

After the soil has been sterilized, it should be handled only with clean implements. Moulds and insects can be reintroduced very easily into the sterilized soil, and shovels and containers for the soil should be washed with 2 per cent formalin.

The soil, when added to the beds, should be friable and moist. If a moist compost has been prepared, the casing soil can be drier than otherwise.

CARE OF THE BEDS

It is important to water the beds, through a fine hose, with water of good quality. The spawn will be killed if the watering is too heavy and water seeps through the casing soil into the compost. The mushrooms are produced in flushes and the times of watering should be adjusted to suit the picking of the crop. Thus one watering is given just after picking.

The sheds need to be ventilated so that the air in the shed is replaced several times each day. The times for doing this are important. Mushrooms grow best at a temperature of 60 deg. F. If the temperature of the shed is high, the maximum amount of ventilating should be performed at times when the air is cool. On the other hand, if the sheds are below the most favourable temperature, ventilation so that the warm air of the daytime is allowed into the shed is beneficial. There is one caution—warm, *moist* air will permit harmful condensation of moisture on beds and mushrooms if allowed to enter a cool shed.

In practice, a constant but small amount of ventilation is often possible. Besides recharging the house with fresh air another aim of ventilation is to provide a relative humidity of below 90 per cent.

HARVESTING

When picking the mushrooms, the stem and base of the plant should be twisted from the soil and the base cut off and placed into a container which is later removed from the shed. The cap should be placed in a clean container. They may need brushing before being packed for sale. After picking the crop, the soil should be levelled again.

Yields of mushrooms heavier than 2 lb. a sq. ft. of bed are often obtained. *Growing operations should be examined for faults any time yields do not exceed 1 lb. a sq. ft., and the experienced grower should aim for higher yields than this.

DISEASES AND PESTS

Diseases can appear in a bed. The surest way of dealing with them is to soak thoroughly the diseased area and 1 ft. to each side with a solution of 2 per cent. formalin, and cover with wet bags to retain the fumes. Further advice on particular diseases can be obtained from the Department of Agriculture and Stock.

Pests are a constant trouble in mushroom sheds. Commencing with the filling of the beds, a routine dusting with 2 oz. of 10 per cent. benzene hexachloride dust to each 6 sq. yd. of bed should be given every five days. Further information on uncommon pests may be obtained from the Department of Agriculture and Stock.

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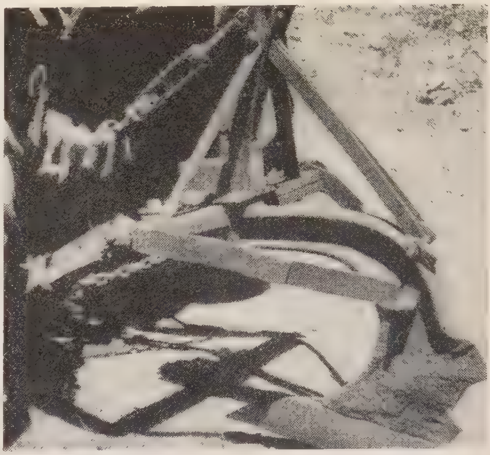
* *The price to growers at the present time averages 6s. a lb. But the Queensland market for mushrooms is a specialised one, and intending growers would be well advised to pre-arrange an outlet for their crop.—Editor.*

3-Point Ripper

The photo. on the right shows how Mr. H. Beasley, of Chinchilla, converted a road plough into an efficient three point linkage ripper. Mr. Beasley has used this implement to contour rip his pasture to encourage water absorption. In combination with his farm dozer it has also been used extensively in the construction of farm ponds and turkey's nest dams. For trench silos, which Mr. Beasley and neighbouring farmers consider essential, a ripper of this sort is invaluable.



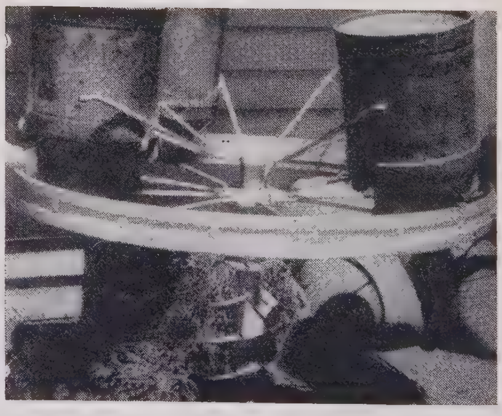
Water Pressure For The Dairy

Low water pressure means a lot of broom work when it comes to cleaning the dairy. Mr. Beasley looked for a way around the problem, hence the 44 gal. drum on the top of a 25 ft. pole. The drum is filled by a small diameter pipe coupled to the milk pump. Water from the dairy is pumped into the drum during milking. After milking, the water from the drum feeds back to the dairy by a 2-in. pipe. This gives tons of pressure, which means that brooming is done quickly and effectively.

Can Drainer

Mr. Beasley has found an old farm wheel a simple and efficient stand for draining his cream cans. Alternate spokes on an old combine wheel were cut and pulled up to provide a frame to hold the cans. The axle was secured in the ground. This left the wheel free to turn when the cans were being loaded.

- *Contributed by*
  R. F. S. KELSEY,
  Soil Conservation Officer.



Pasture and Crop

PALATABLE and highly nutritious silage can be made from cowpeas and other high protein crops, but the job calls for a little extra care.

For good silage, sufficient lactic acid must be formed during the fermentation process. This means that the crop must have a high content of sugar or starch that can be converted into sugar. Cowpeas and other high protein crops are rather low in sugar.

There are several ways of overcoming the shortage of sugar. Perhaps the simplest is to wait until the crop is fairly mature. Cut cowpeas for silage when the first pods have filled, and lucerne at the early bloom stage. Another remedy is to mix the high-protein crop with one low in protein like maize, sorghum or mature grass. The addition of sugar, fermentable starch, mineral acid or sodium metabisulphite to the green material is another solution. For information on these methods, consult your local Adviser in Agriculture.

—*J. E. RAWSON, Agronomist.*

SUMMER pastures need adequate food as well as moisture. The two plant foods most needed by pastures in Queensland are nitrogen and phosphorus, and unthrifty pastures should be topdressed with fertilizers containing these two elements. If your pastures need topdressing, consult your local Adviser in Agriculture. He will tell you the best fertilizer to use and the most economical rate of application for your particular soil. When you can't consult an agricultural adviser, try a mixture of equal parts of sulphate of ammonia and superphosphate at 2 to 3 cwt. an acre.

—*A. HEGARTY, Agrostologist.*

LAST year's tobacco stalks and volunteer plants in the fields, around barns, sheds and houses are a menace to the industry. They allow diseases and insect pests to survive from one season to another. All these stalks and plants should be destroyed.

Surely it is not necessary for every grower to be actually compelled to destroy old tobacco plants before he will do so. In their own interests, all growers should be very thorough in doing this job. It pays to keep the farm clean, because it has been shown repeatedly that dirty farms are the first to suffer from insects and diseases and then they infect their neighbours' farms.

—*E. J. McDONALD,*
Adviser, Tobacco Culture.

CULTIVATION performs four useful functions—it eradicates competing weeds, allows better penetration of rain, reduces evaporation and assists growth by aerating the soil.

In the case of cotton, clean cultivation pays off particularly, because soil moisture is usually at a premium. Competing weeds or grasses draw heavily on soil moisture. This may result in a setback to the crop which may not have occurred had there been no competition.

On the other hand, excessive cultivation or movement of the soil can result in a loss of soil moisture by evaporation. Deep inter-row cultivation of cotton where moist soil is brought up to the surface should be avoided. For this reason, cultivate before weeds have formed a good root system. At this stage, shallow cultivation is effective without disturbing the lower moisture-holding layer of the soil.

Early cultivation is easier, faster and cheaper.

STONES, roots and small tree branches can seriously damage mechanical cotton pickers.

A few days spent in cleaning up new cultivations can save a lot of time and trouble later on. While the crops are small, it is easy to see these obstructions, and a trailer can be pulled down the rows without damage to the plants.

On old cultivations, the butts of last year's plants may also cause interference particularly where late preparation has prevented the trash from rotting down.

—W. G. STEELE,
Senior Adviser in Agriculture.

RUST, the silent enemy of all farm machinery, can cause serious damage. The best form of protection is to store the machinery in a dry place immediately after use. Application of grease isn't enough, as over a period it gives only partial protection. It's far wiser to use one of the rust-preventing preparations being sold commercially. Many of these preparations cost less than lubricating oil and are cheap compared with the costly damage they prevent. The time to apply a rust-preventing preparation is immediately after the machine finishes its seasonal work.

—C. G. WRAGGE,
Agricultural Engineer.

Pastures For Ridges And Flats

"M.S.", of Morayfield, seeks a pasture mixture for sandy ridge country and for fairly dry tea-tree flats, and inquires if Townsville lucerne and molasses grass can withstand couch grass invasions.

Answer: Townsville lucerne and molasses grass will withstand blue couch grass invasion for up to four years under good management.

Before planting these species, it is important to prepare the ground well. Do not graze them heavily or continuously, as such treatment will quickly result in their decline and so aid the couch invasion.

On the sandy soils in the Caboolture district, Rhodes grass has performed well and can be recommended.

A pasture mixture which should give good summer and winter growth in the district is as follows:—

New Zealand white clover	2 lb.	per acre
Montgomery red clover	1 lb.	
H1 rye grass	4 lb.	
Phalaris arundinacea	2 lb.	

When planting this mixture on the flats, add 8 lb. of paspalum to the acre, and, when planting the ridges, omit the paspalum in favour of 8 lb. Rhodes grass or 5 lb. green panic to the acre.

Where irrigation is not possible, the mixture should be planted between late January and mid March.

Paspalum is an excellent grass to grow on alluvial flats and the better quality ridges.

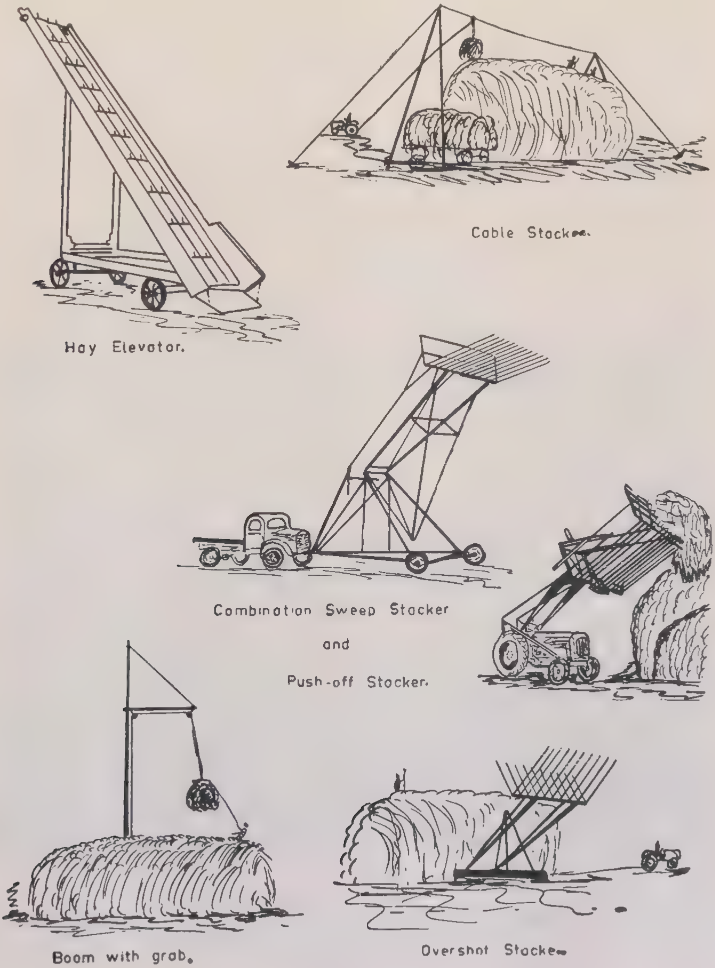
Machinery For Hay And Silage - II.

By Officers of
The Agriculture Branch.

In moving the crop from the field into storage, different methods are used and these vary from farm to farm.

The hand loading method is used on farms where the volume of hay or silage to be handled is relatively small. With this method the cost of equipment is low, but the labour demand is high and the work is strenuous. For handling larger tonnages, a wide range of machinery is available.

This includes hay loaders, hay sweeps, hay stackers, buckrakes, hay balers, bale loaders and stackers, forage harvesters, blowers and elevators.



Cable Stacker.

Hay Elevator.

Combination Sweep Stacker and Push-off Stacker.

Boom with grab.

Overshot Stacker.

Plate 14.

Various Types of Hay Stackers.

Hay Loaders.

The hay loader is a transportable forking and elevating mechanism which, when hitched behind a wagon, picks up the hay from the swath or windrow and delivers it on to a wagon. It saves time and manual labour in loading loose hay on to wagons.

Hay loaders are made in two general types—the oscillating fork type, and the continuous apron type with a cylindrical device to pick up the hay.

The oscillating fork type (Plate 15) is the most popular because of its simplicity. It is usually less expensive than the conveyor type. It continues to force the hay on to the load even when the loader operator does not keep the delivery end clear.

The conveyor type handles the hay more gently than the fork type. However, it tends to drag the hay back with it unless the delivery end is kept clear.

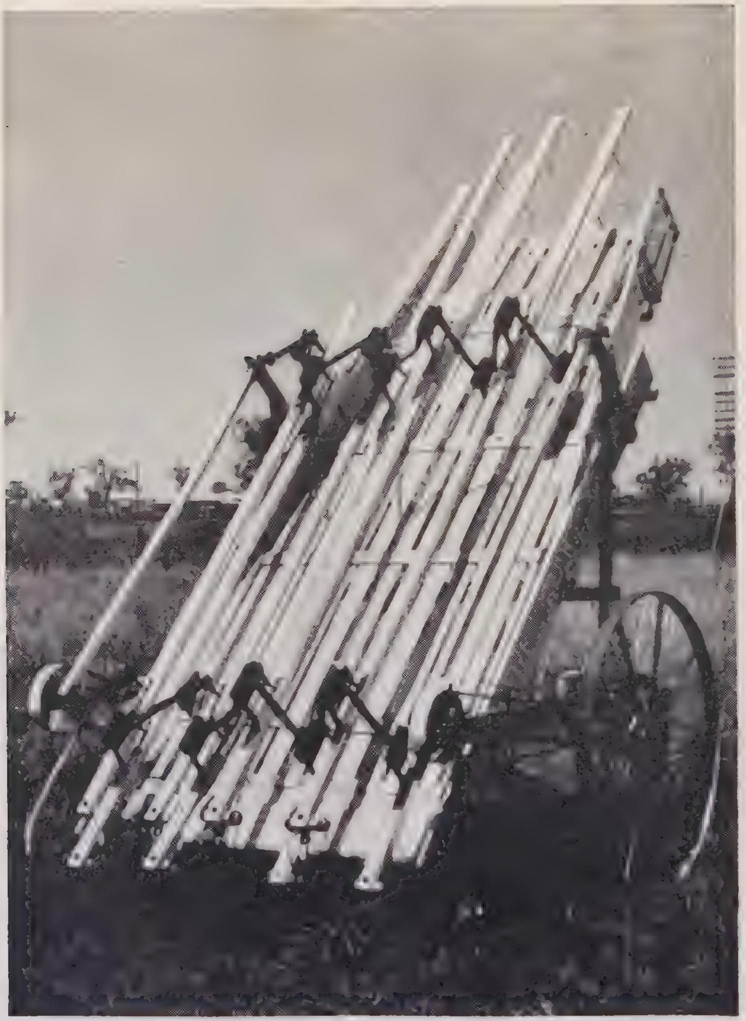


Plate 15.

A Ground-drive Oscillating Fork Type Hay Loader for Trailing Behind a Hay Wagon.

Hay Sweeps.

When hay is to be stacked in or adjacent to the paddock in which it is made, the sweep is a useful labour-saving device. This method of collection may be used where the hauling distance is less than half a mile and where paddocks are reasonably smooth and firm.

Sweeps of various types and sizes can be mounted on tractors and even cars, usually in front (Plate 16).

A hay sweep consists of a frame with a set of long wooden teeth, about a foot apart, projecting forwards. The teeth should be made of suitable timber fitted with metal shoes at the tips. The tips of the teeth should be tapered from the top and bottom, not just from the bottom. Teeth tapered only from the bottom tend to function like slide runners and ride over the hay rather than under it.

Sweeps are normally 10-12 ft. wide and are capable of carrying loads of up to half a ton of hay.

Hay may be picked up from either the swath or the windrow. Most operators prefer to pick up from a windrow as this permits the gathering of a larger load.

In gathering hay from a swath, two 6 ft. swaths may be gathered simultaneously.

The sweep generally follows the direction the mower has travelled.

Some types incorporate a lifting mechanism operated off the tractor hydraulic system. With these, double loads may be carried. The operation consists in depositing a second load on top of half a load previously gathered and dumped.

Many tractor sweeps are successfully used without any lifting mechanism.

Hay Sweep Stackers.

Combination sweep stackers mounted on two wheels (Plate 14) are available. These are pushed by a tractor, truck or car, and are capable of elevating hay to a height of 20 feet. Lifting is achieved either by hydraulic ram or by cable. Cable-operated sweep stackers are ground-driven by the sweep wheels.

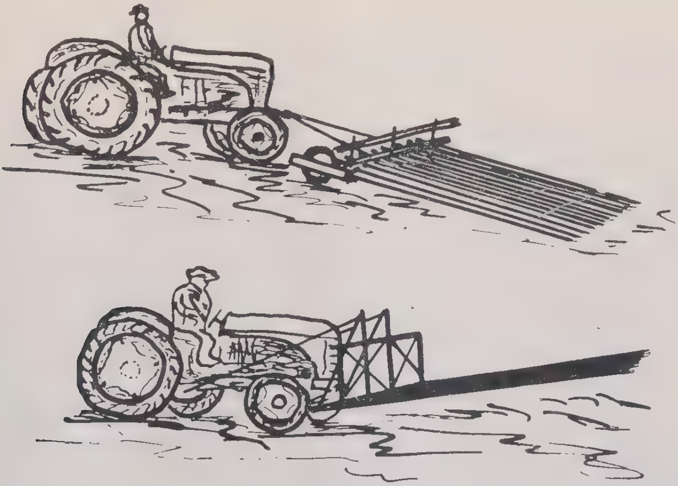


Plate 16.

Pivoted Sweep (top) and Mounted Sweep (bottom).

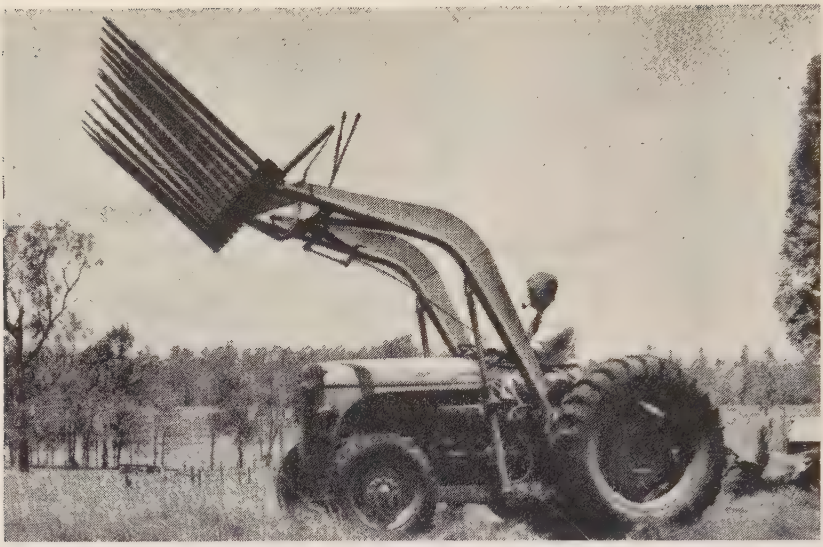


Plate 17.

Hydraulically-operated Hay Sweep Stacker Attachment to a Front-end Loader in Position to Dump.

Push-Off Tractor Sweep and Stacker.

This type of sweep (Plate 17) was first developed in the United States and consists of a small sweep attached to a hydraulic front-end loader. It may have a back which can be pushed forward to deliver the load. The lift and push-off devices can be operated independently, being actuated by separate hydraulic rams.

The stacker may be used exactly like a sweep until the load is collected. It can then deposit its load on to a trailer or directly on to a small stack. The tractor is naturally unstable when carrying a heavy load in the raised position. It is advisable to keep the load only slightly raised on journeys to the stack and to avoid making sharp turns.

Push-off stackers may supersede other types of sweeps. They utilise the hydraulic front-end loader and are efficient in operation.

Apart from those mentioned above, numerous types of devices may be used to assist stacking. These include boom with grab, derrick with grab, cable or combination sweep stacker, the overshot stacker and the standard hay elevator (Plate 14).

Buckrakes.

One of the most valuable types of implement for collecting crops for hay and silage is the relatively cheap buckrake, which is illustrated in Plates 18 and 19.

In combination with a mid-mounted mower, the buckrake becomes an effective one-man fodder conservation unit.

The buckrake for collecting green crops is usually narrower than a hay sweep. The pointed metal tines are shorter, and it is important that they be smooth and perfectly straight.

Buckrakes may be mounted either at the rear of the tractor or on the hydraulically operated front loader. In the latter case the buckrake may be used for loading the green crop into trucks or trailers for long haulage (Plate 18).

Rear mounting is usually advantageous where silage crops are to be transported. The weight of the load on the rear wheels improves traction. This makes it possible for the tractor to be run right over the silage in the trench or clamp, thus aiding consolidation.

Some buckrakes can be used either at the front or at the rear. Where a mechanical catch for the rear-mounted buckrake is fitted, the tractor can carry a front and a rear load.

The buckrake may not pick up cleanly in very short crops and some difficulties in picking up may occur also where the ground is uneven or soft. Loss of material through dropping during transport may be considerable with short crops, but with long crops the amount dropped will be small.

Normal loads are only about 5-6 cwt., and generally it is not economical to carry loads of this small size more than a quarter of a mile.

Two undisturbed 5 ft. swaths can be gathered in one operation, with the buckrake travelling in the same direction as the mower. If a 6 ft. mower is used, it is advisable to fit swath boards at each end of the cutter-bar; otherwise the width of the two swaths will be greater than the width of the buckrake.

Very light crops may be picked up more cleanly by travelling across the swaths or by first putting several swaths together with a side-delivery rake.

Heavy crops should not be windrowed, as the crop is then usually more difficult to gather.

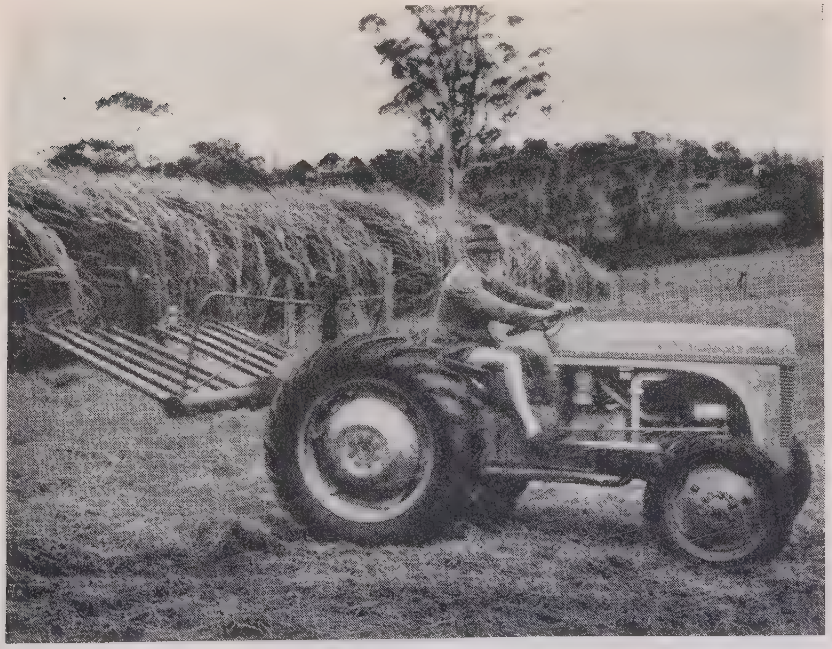


Plate 18.

Rear-mounted Three-point Linkage Buckrake with Centre Tine Removed to Assist Dumping of Kikuyu Grass Being Ensiled. Cowcane in Adjoining Paddock.

Plate 19.

Buckrake Load of Italian Sweet Sorghum being Backed up on to Stack Silo at Mandanyi, Chinchilla. Typically Uneven Load.

For efficient operation the points of the tines must follow the ground closely. All tines should therefore be in alignment, particularly at the points. Bent tines should be straightened or replaced, and rusty and dirty tines polished to facilitate picking up soft green material. The beam should be set just clear of the ground and the height and angle of the tines adjusted by making the necessary alterations to the top link of the hitch. If the beam is set too high, trouble may be encountered through tines digging into the ground. This trouble may also occur with bent tines, or when working on soft ground. When the points dig in, always drive forward away from the load to avoid damage.

Balers.

The stationary type of hay baler has long been used for baling hay or straw from the stack or for baling in the paddock in conjunction with hay sweeps or buckrakes.

The advent of the pick-up baler, however, meant a big advance in fodder conservation methods, as it eliminated the prior haulage and/or stacking of the hay.

The pick-up balers in common use are either P.T.O.-driven or engine-functioned. A rectangular bale is produced which is tied automatically with wire or twine. Machines producing rolled cylindrical bales are also available.

Engine-functioned types can handle uneven windrows and can be towed by a small tractor. P.T.O.-driven

Plate 20.

Tractor and Engine-functioned Hay Baler Baling Bush Hay at Colwell Station, McKinlay.

Plate 21.

An Automatic-tying Pick-up Baler in Action in Lucerne.

types require a tractor of 30-35 h.p. for satisfactory operation. Self-propelled balers capable of a high rate of work are available overseas and are usually employed where contract work is done on a large scale.

In addition to handling hay and straw, the pick-up baler can be used to bale green crops for silage if suitably modified.

Bale Loaders and Stackers.

Bale loaders are now manufactured which can be used either for loading or for loading and stacking.

Loaders mounted on pneumatic-tyred wheels are either ground-driven or engine-functioned. They may be

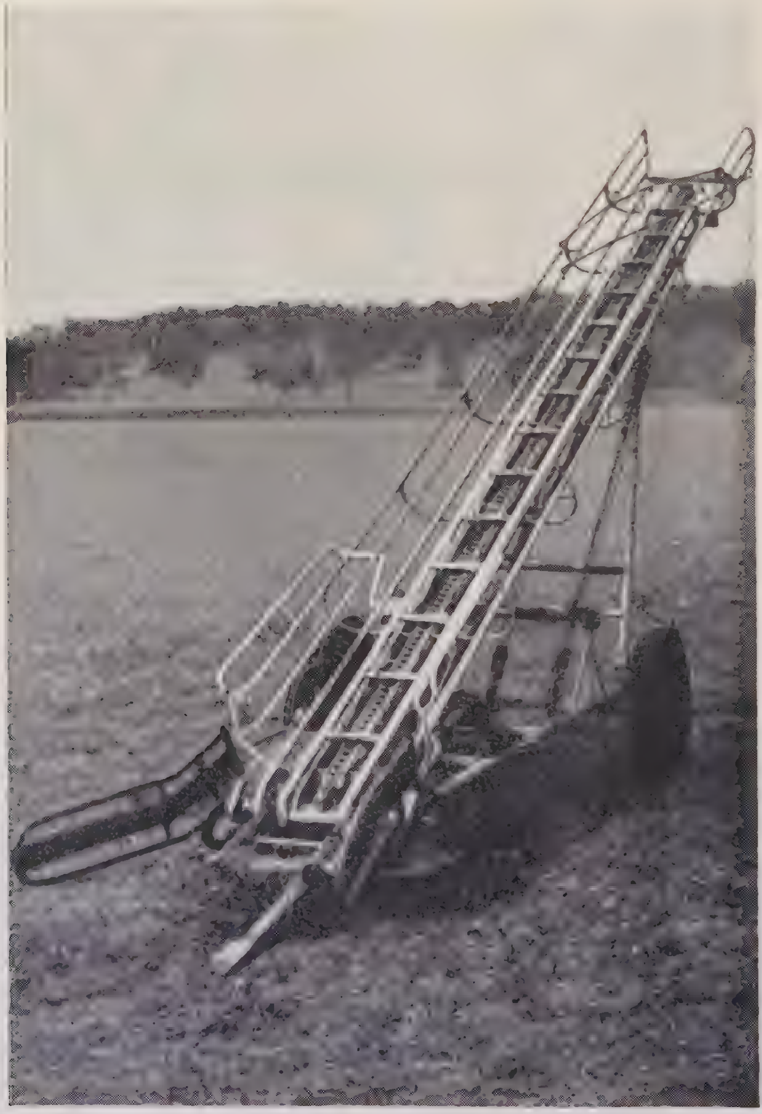


Plate 22.

An Engine-functioned Hay Bale Loader and Stacker.

flexibly attached to the side of the truck or trailer. Bales are automatically picked up and conveyed to a platform from which they are removed by hand for stacking.

Combined loaders and stackers are engine-functioned and hitched in a similar manner to the side of a truck or trailer, or mounted over a truck or tractor. When employed as a stacker unloading from the truck, the front elevator of a hinged-type loader-stacker is raised to the desired height and the direction of drive reversed. With the non-hinged type, the whole elevator is raised to the desired height with the direction of drive unaltered.

Forage Harvesters.

The forage harvester is the most versatile machine for handling crops for conservation purposes. It is designed to harvest row crops such as sorghum and maize for silage, and in addition will handle pasture and the smaller crops that are grown for hay and silage. In all cases the harvested material is chopped up in the machine and discharged into a trailer while the forage harvester is in motion.

Forage harvesters available in Australia may be divided into three main groups which differ in the type of cutting mechanism employed.

Group A includes all types incorporating a conventional reciprocating cutter-bar (Plates 23-25).

Group B employs horizontally rotating cutter plates or blades which also assist in elevating the material into a laceration chamber (Plate 26).

Group C relies on a horizontal rotating shaft to which are attached a series of swinging bar cutters somewhat similar to

Plate 23.

A Row-crop Forage Harvester Operating in a Maize Crop at Nerang.

those in a hammer mill (Plate 27) or 7 in. x 3 in. cutter blades each of which is suspended from the shaft.

The majority of forage harvesters in Group A require separate attachments for harvesting row crops, broadcast forage or pasture crops and windrowed crops. The basic unit of Group B harvesters will handle all crops with the exception of row crops, for which an attachment is available. Harvesters in Group C rely on the one basic unit for all crops whether standing, in swaths or in windrows.

With the exception of one type in Group C which is a self-contained unit comprising the cutter and self-emptying trailer, all forage harvesters require separate trailers or trucks into which the chopped material is blown.

It will be seen that forage harvesters may combine all operations from cutting to loading into transport. If self-emptying trailers are used, the crop can be put into a trench or clamp without any manual handling at all. If the material is to be stored in tower silos or stacks, it must be fed into a forage blower.

Forage harvesters are either P.T.O.-driven or engine-functioned. Where heavy crops are to be handled, the engine-functioned type is favoured, because most P.T.O.-driven models require a tractor of 35 h.p. or more.

The output of a forage harvester varies according to the size of the machine, the power supplied, the type and yield of crop involved and the permissible speed of operation. It depends primarily on the yield of the crop.

Medium-sized units have an output of 3-4 tons of chopped hay per hour, 5-10 tons of grass silage per hour, and 7-15 tons of maize or sorghum per hour.

The capital investment in a forage harvester is about the same as that in equipment for making and handling baled hay.

Plate 24.

Cutting a Maize Crop with a Forage Harvester for Feeding Green to Dairy Stock at Mannuem.

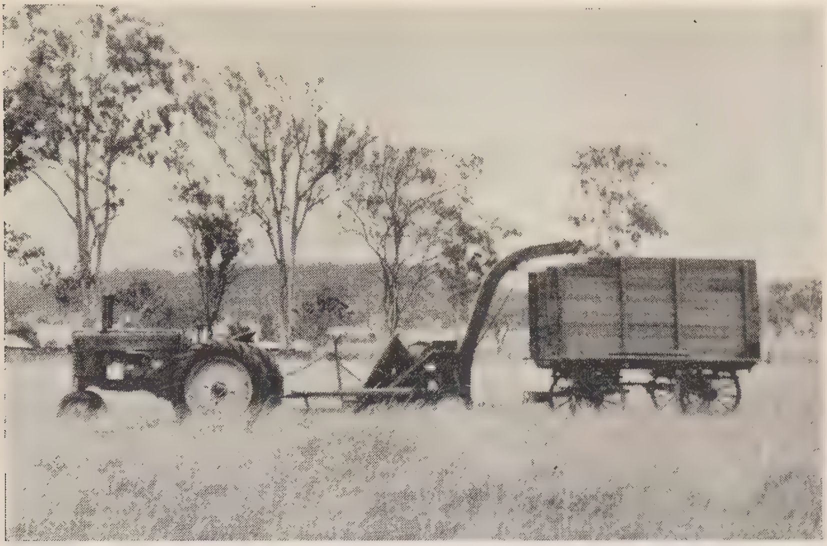


Plate 25.

Tractor, Row-crop Forage Harvester and High-sided Wagon Used for Ensilage Making and Feeding Stand-over Sorghum to Dairy Stock.

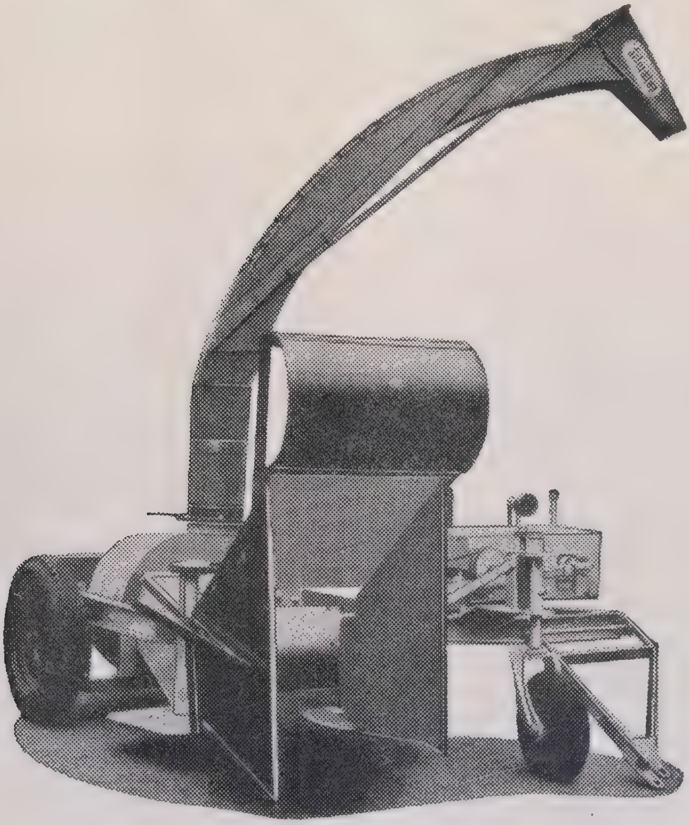


Plate 26.

Forage Harvester With Horizontally Rotating Cutter Plates.

Plate 27.

Forage Harvester With Swinging Bar Cutters.

Forage Blowers and Elevators.

Loads of chopped forage can be dumped into pit or trench silos. In other cases, however, the crop must be elevated into tower silos or stacks by blowers or by elevators.

Blowers are more compact and take up less yard space in operation. By means of a manually operated deflector, the chopped material can be distributed evenly in the silo. They require, however, much more power than elevators.

In operation, the blower or elevator feed table lifts up out of the way to enable the truck or trailer load to be moved into position. The feed table is then lowered back into position and the load delivered from the rear of the trailer to the feed table.

Blowers are capable of handling large quantities of chopped material. For efficient and economical operation, it is desirable that self-emptying trailers be used in conjunction with blowers. Hand forking of the material from trailer to blower feed table is not only difficult and strenuous but also uneconomical due to the slow feed rate.

A forage blower handling chopped corn or sorghum elevates largely by throwing rather than blowing. Therefore an important feature of blower design is the need to maintain a clearance of not over an eighth of an inch between the tips of the fan blades and the fan housing.

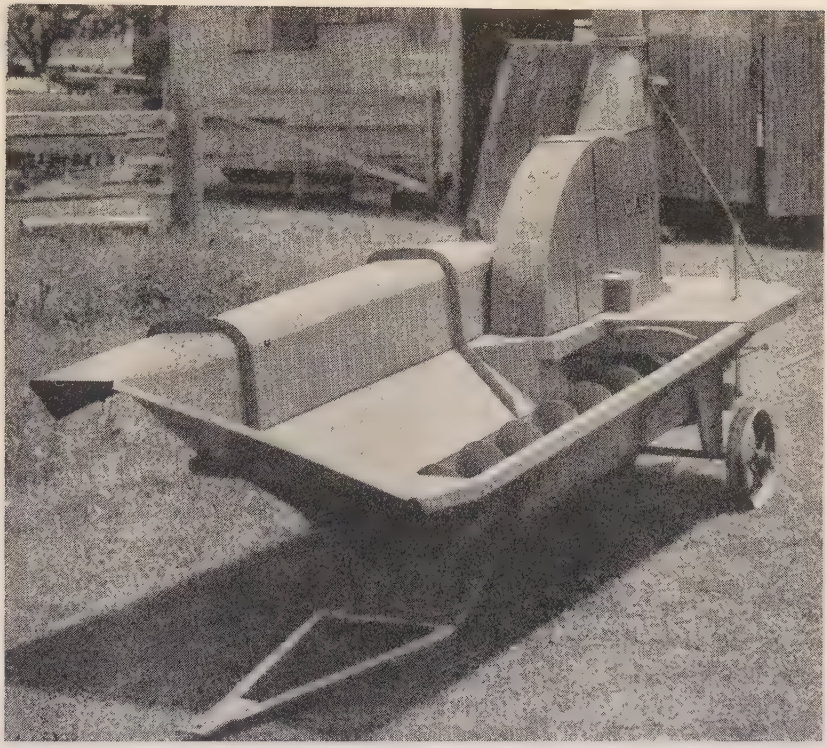
Table 3 gives the recommended minimum fan speed when the blower is driven by a 5 h.p. or 7½ h.p. electric motor. When operating with 15-25 h.p. tractors, the fan speed should be increased 10-20 per cent. and for tractors over 25 h.p. the speeds should be increased 15-25 per cent. Grass crops require a somewhat higher fan speed than maize or similar crops.

TABLE 3.

Minimum Speeds for Elevating Corn into Silos of Different Heights.

Height of Silo in Feet.	30	40	50	60
Peripheral velocity of fan in ft./min.	4,160	4,788	5,416	5,887

Source: Department of Agricultural Engineering, University of Wisconsin.



Pate 28.

Ensilage Blower with Hopper and Auger Feed.

Blower delivery pipes vary in size from 7 in. to 9 in. in diameter. It is generally considered that all sizes are suitable for silage, but in the handling of chopped hay the 8 in. and 9 in. sizes are preferable.

For elevating silage, a 180 deg. short radius elbow is used at the top of the delivery pipe. For hay and straw, a long radius closed elbow is desirable. Frequently only a curvature of 60 deg.-75 deg. is needed for delivering hay or straw into a stack.

A satisfactory blower should have a capacity of 20-30 tons of silage material or 8-10 tons of dry chopped hay per hour. Blower power requirements may be calculated at the rate of 1 h.p. per ton per hour. In other words, a 25-30 h.p. tractor or motor is required to operate the blower at full capacity.

A *molasses pump attachment* is obtainable for some types of blowers. It is driven from the feeder drive so that it starts and stops with the feeder. It draws the molasses mixture (equal parts of molasses and water) from the drum or tank and drops it on to the feed as it enters the blower. The steady flow from the pump by means of a metering device and the violent mixing action of the blower fan are claimed to spread the molasses evenly as a coating on the chopped feed.

Table 4 gives the recommended rates for using molasses as a preservative for silage.

An average-sized wagon or trailer 7 ft. x 14 ft. will carry approximately 1 ton of green chopped forage per foot of depth. This figure can be used to estimate the amount of preservative needed for each load in cases where molasses pumps are not used. The molasses mixture may be watered over the load of chopped forage before it is unloaded into the silo.

TABLE 4.

RECOMMENDED RATES IN POUNDS/TON.

Preservative.	Legumes.	Legume-Grass Mixture.	Grass-Cereal Mixture.
Molasses–Liquid	80–100	70–80	60–70

One gallon of molasses weighs approximately 13 lb.

Source: Agricultural Extension Services, Iowa State College.

[TO BE CONTINUED.]

* * *

Precious Water

Water that cannot be absorbed by the soil should be held for stock or irrigation.

Tuberculosis-Free Cattle Herds.

(As at 1st April, 1959.)

Aberdeen Angus.

G. H. & H. J. Crothers, "Moorenbah," Dirranbandi
A. G. Elliott, "Ooraine," Dirranbandi
W. H. C. Mayne, "Gibraltar," Texas

A.I.S.

M. E. & E. Scott, "Wattlebrae" A.I.S. Stud, Kingaroy
F. B. Sullivan, "Fermanagh," Pittsworth
D. Sullivan, "Bantry" Stud, Rossvale, *via* Pittsworth
W. Henschell, "Yarranvale," Yarranlea
Con. O'Sullivan, "Navillus" Stud, Greenmount
H. V. Littleton, "Wongelea" Stud, Hillview, Crow's Nest
J. Phillips and Sons, "Sunny View," Benair, *via* Kingaroy
Sullivan Bros., "Valera" Stud, Pittsworth
Reushle Bros., "Reubydale" Stud, Ravensbourne
A. C. and C. R. Marquardt, "Cedar Valley," Wondai
A. H. Sokoll, "Sunny Crest" Stud, Wondai
W. and A. G. Scott, "Welena" A.I.S. Stud, Blackbutt
G. Sperling, "Kooravale" Stud, Kooralgin, *via* Cooyar
C. J. Schloss, "Shady Glen," Rocky Creek, Yarraman
W. H. Thompson, "Alfa Vale," Nanango
S. R. Moore, Sunnyside, West Wooroolin
H.M. State Farm, Numinbah
Edwards Bros., "Spring Valley" A.I.S. Stud, Kingaroy
D. G. Neale, "Grovely," Greenmount
A. W. Wieland, "Milhaven" A.I.S. Stud, Milford, *via* Boonah
W. D. Davis, "Wamba" Stud, Chinchilla
Queensland Agricultural High School and College, Lawes
C. K. Roche, Freestone, Warwick
Mrs. K. Henry, Greenmount
D. B. Green, "Deloraine" Stud, Durong, Proston
E. Evans, Wootha, Maleny
T. L. and L. M. J. Cox, "Seafield Farm," Wallumbilla
J. Crookey, "Arolla" A.I.S. Stud, Fairview, Allora
M. F. Power, "Barfield," Kapaldo
A. H. Webster, "Millievale," Derrymore
W. H. Sanderson, "Sunlit Farm," Mulgildie
R. A. and N. K. Shelton, "Vuegon" A.I.S. Stud, Hivesville, *via* Murgon
R. R. Radel & Sons, "Happy Valley," Coalstoun Lakes
C. A. Heading, "Wilga Plains," Maleny
G. S. and E. Mears, "Morden," M.S. 755, Toogoolawah

Ayrshire.

L. Holmes, "Benbecula," Yarranlea
J. N. Scott, "Auchen Eden," Camp Mountain
E. Mathie and Son, "Ainslie" Ayrshire Stud, Maleny
B. Goddard, Mt. Tyson, *via* Oakey
C. E. R. Dudgeon, "Marionville" Ayrshire Stud, Landsborough
G. F. H. Zerner, "Pineville," Pie Creek, Box 5, P.O., Gympie
T. F. Dunn, Alanbank, Gleneagle

Friesian.

C. H. Naumann, "Yarrabine" Stud, Yarraman
D. J. Pender, "Camelot," Lytton road, Lindum
S. E. G. Macdonald, "Freshfields," Marburg

Guernsey.

C. D. Holmes, "Springview," Yarraman
A. B. Fletcher, Cossart Vale, Boonah
W. H. Doss, Degilbo, *via* Biggenden
A. C. Swendson, Coolabunia, Box 26, Kingaroy
C. Scott, "Coralgrae," Din Din Road, Nanango
R. J. Wissemann, "Robnea," Headington Hill, Clifton
G. L. Johnson, "Old Cannindah," Monto
A. Ruge & Sons, Woowoonga, via Biggenden
G. Miller, Armagh Guernsey Stud, Armagh, M.S. 428, Grantham
N. H. Sanderson, "Glen Valley," Monto

Jersey.

Queensland Agricultural High School and College, Lawes
J. S. McCarthy, "Glen Erin" Jersey Stud, Greenmount
J. F. Lau, "Rosallen" Jersey Stud, Goombungee
G. Harley, Hopewell, M.S. 189, Kingaroy
Toowoomba Mental Hospital, Willowburn
Farm Home for Boys, Westbrook
P. J. L. Bygrave, "The Craigan Farm," Aspley
R. J. Crawford, "Inverlaw" Jersey Stud, Inverlaw, Kingaroy
P. H. F. Gregory, "Carlton," Rosevale, *via* Rosewood
E. A. Matthews, "Yarradale," Yarraman
A. L. Semgreen, "Tecoma," Coolabunia
L. E. Meier, "Ardath" Stud, Boonah
A. M. and L. J. Noone, "Winbirra" Stud, Mt. Esk Pocket, Esk
W. S. Conochie and Sons, "Brookland" Stud, Sherwood road, Sherwood
Estate of J. A. Scott, "Kiaora," Manumbar road, Nanango
F. W. Verrall, "Coleburn," Walloon
C. Beckingham, Trouts road, Everton Park
G. H. Ralph, "Ryecombe," Ravensbourne
Mrs. I. L. M. Borchert, "Willowbank" Jersey Stud, Kingaroy
Weldon Bros., "Gleneden" Jersey Stud, Upper Yarraman
D. R. Hutton, "Bellgarth," Cunningham, *via* Warwick
J. W. Carpenter, Flagstone Creek, Helidon
H. G. Johnson, "Windsor" Jersey Stud, Beaudesert
S. A. Cramb, Bridge st., Wilsonton, *via* Toowoomba
J. A. & E. E. Smith, "Heatherlea" Jersey Stud, Chinchilla
W. C. M. Birt, "Pine Hill" Jersey Stud, Gundiah
T. Nock, Dallarnil
P. Fowler & Sons, "Northlea," Coalstoun Lakes
F. Porter, Conondale
H.M. State Farm, Palen Creek
B. T. Seymour, "Upwell" Jersey Stud, Mulgeldie
R. N. Burrows, Box 23, Wondai
W. T. Tatnell, Cedar Pocket, *via* Gympie

Poll Hereford.

W. Maller, "Boreview," Pickanjinnie
J. H. Anderson, "Inverary," Yandilla
D. R. and M. E. Hutton, "Bellgarth," Cunningham, *via* Warwick.
E. W. G. McCamley, Eulogie Park, Dululu
Wilson and McDouall, Calliope Station, Calliope

Poll Shorthorn.

W. Leonard & Sons, Welltown, Goondiwindi

Molasses Grass - Centro Useful In Mackay District

By N. E. GOODCHILD,
Senior Adviser in Agriculture.

Pasture trials conducted on the property of Mr. A. Thomas, Funnel Creek, Sarina, show that a molasses grass-centro pasture mixture has a useful part to play in portions of the Mackay district.

In January, 1955, a number of pasture species were planted on the forest ridges in the Funnel Creek area in order to ascertain the most vigorous and most persistent mixtures for this type of country. The average rainfall for this area is about 60 in. a year, of which 75 per cent. falls during the first three months.

The grasses planted comprised, guinea grass, green panic, Rhodes, paspalum and molasses grass, each planted with the well-known tropical legume, centro.

GOOD SEED BED

The Trial area was about 6 acres and the soil was a grey clay loam.

The land was ploughed to the depth of 6–8 in., disced and harrowed so that it provided a reasonably good seed bed.

All seed was thoroughly mixed, and sawdust was added to increase the volume of material to be sown.

The seed mixture was planted in January, 1955, through a sod seeder, and covered in by inverted diamond harrows drawn behind the sod seeder.

Planting was followed by 30–40 in. of rain during February.

BEST HIGHER AND DRIER

A good strike was obtained. Rhodes grass made the fastest growth and dominated the pastures for the first two years and then declined. Guinea grass and green panic never flourished and rapidly declined in vigour and plant population. Molasses grass, paspalum and centro, however, made steady and persistent growth which developed into a regular pattern depending on the soil drainage.

Within three years, paspalum dominated the lower and wetter portions of the ridge, whilst molasses grass and centro dominated the higher and drier areas.

Accurate stocking figures are not available. The paddock was used chiefly as a holding paddock when dipping or before marketing beef cattle. The pastures were, therefore, subjected to heavy grazing pressure for short periods. This type of treatment is required for molasses grass, which in the Cooroy district in south-eastern Queensland has yielded well under similar management.

OTHER PLACES TOO

The persistence and growth of the molasses grass-centro pasture on the drier portions of the forest ridges on Funnel Creek, near Sarina, indicate that this mixture should provide valuable pasture in similar situations which are found on the Sarina Range, Blue Mountain and Bolinbroke districts.

Molasses grass and centro should also be tried on the drier ridges of the coastal country between Mackay and Bowen.

Potted Facts—V

Egg Marketing Boards

By K. C. GUYATT,
Division of Marketing.

With the aim of stabilizing returns to growers, an egg marketing board was set up in Southern Queensland as long ago as 1923. A second board was established in Central Queensland in 1947. Together, these boards controlled the marketing of over eight million dozen eggs in 1957-58.

One of the strongest motives leading to the setting up of a primary products marketing board is the desire to stabilize returns to farmers by ironing out the effect of production surplus to local demand. This certainly was the case with the egg marketing boards.

Unstable market conditions were aggravated by the highly perishable nature of the commodity, and a large body of relatively small producers with no mutual protection who were dependent largely on egg dealers whose activities also embraced the selling of other farm produce and livestock feedstuffs.

The First Board

In such circumstances The Egg Marketing Board was established on June 19, 1923, to market eggs produced by farmers in that portion of south-eastern Queensland within an area of roughly 200 miles radius of Brisbane. Originally the board controlled the produce of flocks of 100 birds or over (including domesticated fowls, ducks, turkeys, or guinea fowl with or without the males and young), but from 1926 the number was reduced to 50 birds. Since this time, similar egg marketing boards have been set up in all Australian States.

Plate 1.

Packing Eggs for Export. Here eggs are coming off a grading machine and being packed for export by staff at the South Queensland Egg Marketing Board.

In 1947, a second autonomous board was set up in Queensland which exercises jurisdiction over an area roughly embraced in a radius of 250 miles of Rockhampton. The establishment of this board followed from the experience of organised market control under the defence powers during the war years, and the growth of the grain growing industries in the Burnett and central Queensland.

Eggs, in addition to being the first commodity for which a board was set up under the general marketing legislation in Queensland (the State Wheat Board was constituted under the Wheat Pools Acts in 1920) are the only commodity for which a board now exists in every Australian State.

Australian Egg Board

Following wartime control of egg marketing, the Australian Egg Board was set up by the Commonwealth Government in 1948 to control the marketing of exports and to act as agent of the Commonwealth Government in connection with the intergovernmental bulk contract with the United Kingdom. This agreement was terminated in 1953. Since that time the board has been re-organised to provide for direct State Board representation, while provision has also been made for the Australian Egg Board to operate export pools. At present all liquid frozen eggs produced by the State Boards and sold in the United Kingdom and Europe is marketed through The Australian Egg Board. With respect to eggs in shell, however, New South Wales has so far refused to join the pool.

Exports to other markets are shipped under licence with the approval of the Australian Egg Board and, to avoid unnecessary price competition, are subject to certain determinations as regards minimum prices.

Eggs Handled

Even within the Boards' area of control, all eggs are not necessarily physically handled by the Boards or their appointed agents. In accordance with the provisions in the legislation, the Boards grant certificates of exemption to certain producers who, under certain conditions, may market their own production. In 1957-58 some 887,902 dozen eggs were sold through these channels in south Queensland. During this year the South Queensland Board itself received 6,620,333 dozen eggs. This compares with 11,085,700 dozen in 1945-46, the year of highest intake, and 1,398,817 dozen in 1924, the first year of operation. In 1957-58, 4,392,519 dozen eggs and 1,160,440 lb. of liquid frozen egg were sold locally. In addition to this, 715,515 dozen eggs and 405,804 lb. of liquid frozen egg were exported overseas.

To ensure continuity of supply throughout the year, 350,130 dozen eggs were held in cold storage for winter requirements.

The gross payment by The (South Queensland) Egg Marketing Board to producers for 1957-58 was £1,395,058, which averaged 4s. 2.57d. a dozen. After the deduction of handling charges and equalising losses sustained as a result of low export prices, a net average payment of 3s. 7.36d. a dozen was paid. An indication of how the net figure is influenced by low export prices is given by a comparison of local and export prices. In 1957-58 local prices for eggs in shell which fluctuated seasonally realised an average of 4s. 8.3d. a dozen. The net return to the Board on eggs exported to Europe, however, was only 2s. 11.39d. a dozen.

C.Q. Board

During 1957-58 The Central Queensland Egg Marketing Board marketed 411,875 dozen eggs of which 21,600 dozen were through producers selling under a certificate of exemption. All these eggs were sold locally in shell or as liquid frozen egg, with an average gross return of 4s. 8.43d. a dozen and 3s. 11.25d. a dozen net to the producers supplying the Board.

Since the Board was established in 1947, the intake, after reaching almost 600,000 dozen in 1948-49, declined to 113,716 dozen in 1952-53, but has subsequently recovered.

◆

Living Space For Carrots

By K. M. WARD,* Senior Horticulturist.

The costs involved in the production of vegetables these days are so high that the grower wants to be sure his methods will bring the greatest reward. Maximum crop yield in itself will not always achieve this result. Market or consumer preference for high quality produce with specific characteristics is an important factor that must be borne in mind.

Investigations on vegetables have shown that both yield and quality may be influenced by the spacing of the plants in the field. By and large, if overcrowding occurs, quality may be affected and, if spacing is unnecessarily wide, yield will suffer.

With carrots, distance between plants within the row is usually controlled by hand thinning in the early seedling stage; though sometimes low seeding rates are used to avoid a dense stand of plants and reduce the amount of hand work involved.

In Queensland, hand thinning is widely practised and the problem is to decide on a spacing between plants which will give the best yield of the type of carrot most in demand. That demand, at present, is for moderately sized, well-formed roots, crisp in texture and bright in colour.

In 1956 and 1957, experimental work gave some pointers on the effects of spacing within the row on root size, yield and culinary properties. The work was done in field trials conducted on a red-brown clay loam, at the Redlands Experiment Station, between April and mid-September each year. The variety used was Topweight. Growing conditions were satisfactory, and irrigation was applied as required. Weeds were controlled with white spirit.

How is Root Yield Affected?

A preliminary trial showed that whilst individual root size increased as spacing in the row increased, total yield per acre of marketable roots decreased.

In subsequent experiments, the distance between plants ranged from 1 to 7 in. and, for comparison, control plots were unthinned. The effect of different spacings on the amount of roots in each grade †is shown in Plates 1 and 2.

No. 1 Grade Roots

Plate 1 shows at which spacing the greatest yields of large, medium and small No. 1 grade roots were obtained. The greatest quantity of large roots was produced by spacing at 3 in. of medium at 2 in., and of small at less thas 1 in.

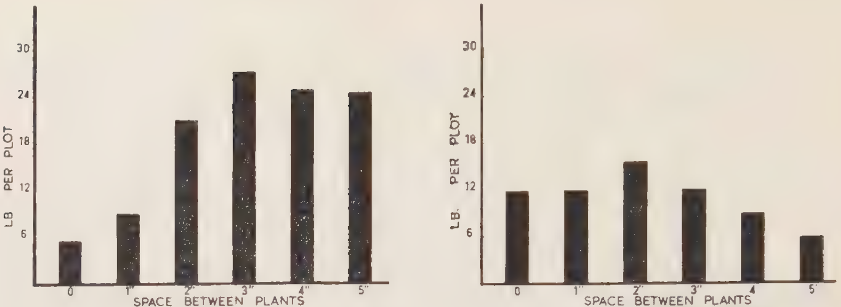
**This article is based on work conducted by Mr. I. S. Wilson, who before his death, was Officer in Charge of the Redlands Experiment Station.*

†In measuring yields (tops off), marketable roots were graded for size—

No. 1 Grade—

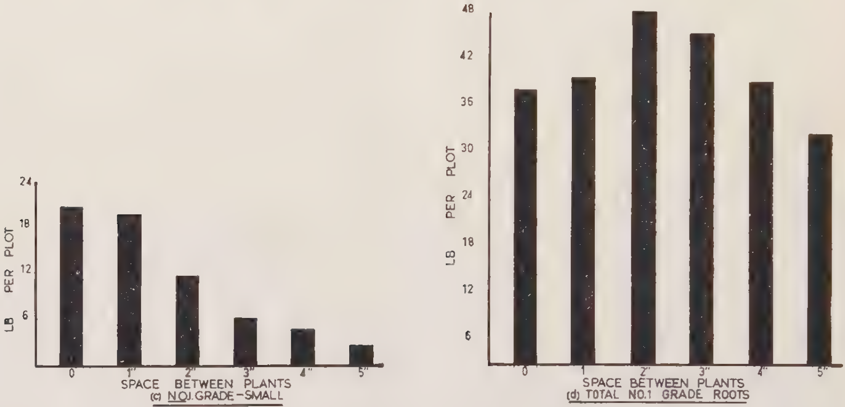
Large Medium Small	Not less than 1½ in. diameter and not less than 4 in. in length.

No. 2 Grade.—Not less than 1 in. diameter and not less than 3 in. in length.



(a) NO. 1 GRADE – LARGE

(b) NO. 1 GRADE–MEDIUM



(c) NO.1 GRADE–SMALL

(d) TOTAL NO.1 GRADE ROOTS

Plate 1.

Effect of Plant Spacing in the Row on Yield of No. 1 Grade Carrots.

The maximum total yield of No. 1 grade (large, medium and small) carrots was given at the 2 in. spacing, and thereafter there was a steady decline in yield as distance between plants increased. Thus yield at 3 in. was 7 per cent. less than at 2 in. and, at 4 in. it was 20 per cent. less. When the space was increased to 7 in. yield declined by 57 per cent.

No. 2 Grade and Unmarketable Roots

The greatest quantity of No. 2 grade carrots was obtained when no thinning was done. At the 2 in. spacing, the amount of roots in this grade was almost negligible, the crop being almost wholly No. 1 grade roots.

The unmarketable roots were too small or too misshapen to meet market requirements. At 2 in. and wider spacings, the amounts of this type of root were not affected by distance between the plants.

Total Yield of Marketable Roots

Plate 2 shows that the maximum yield of marketable carrots (Nos. 1 and 2 grades) was obtained when no thinning was done.

On an Acre Basis

The experiments have shown that the proportion of carrots in the various size grades varies with the spacing between plants. How does this affect over-all yield? The answer is given in Table 1 in which the yields are expressed on a per-acre basis.

Firstly, with *No. 1 grade* carrots, the highest yield of *large* roots (6.2 tons) occurs at the 3 in. spacing, as against the 4.8 tons at 2 in. The

TABLE 1.

WEIGHT OF ROOTS PRODUCED PER ACRE (TONS).

Spacing.	No. 1 Grade.		No. 2 Grade.	Total Marketable Yield.
	Large Only.	Total.		
0 in	1·3	8·2	4·2	12·4
1 in.	1·9	8·5	2·6	11·1
2 in.	4·8	10·4	0·9	11·3
3 in.	6·2	9·7	0·5	10·2
4 in.	5·7	8·3	0·3	8·6
5 in.	5·4	6·9	0·4	7·3

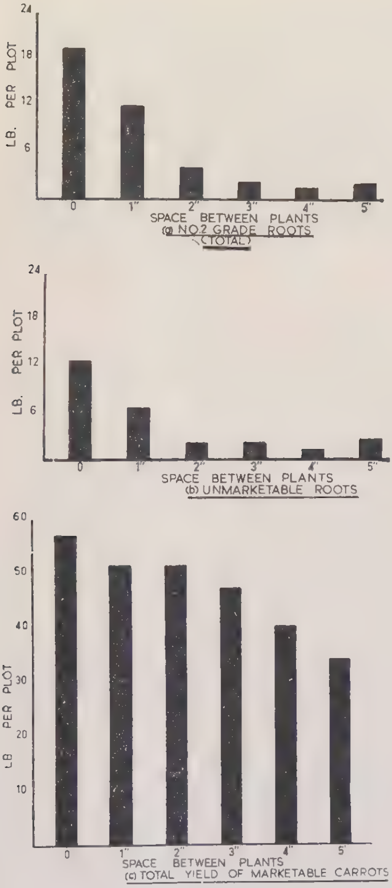


Plate 2.

Effect of Plant Spacing in the Row on Yields of:—a. No. 2 grade; b. Unmarketable; and c. Total Marketable (No. 1 + No. 2 grade) Carrots.

total yield of No. 1 grade roots (large, medium and small), however, is highest (10.4 tons) at the 2 in. spacing, as compared with 9.7 tons at the 3 in. spacing. The total yield of marketable roots (Nos. 1 and 2 grades) begins to decline sharply at spacings wider than 2 in.

How is Size of Root Affected?

In assessing the effects of spacing on root size, a major point of interest is the proportion of carrots falling into the various size groups.

The average weight of roots in each of the classes into which the crop was sorted was as follows: No. 1 grade—large, 9.1 oz.; medium, 5.9 oz.; small, 3.8 oz. No. 2 grade—2.9 oz.

As spacing was increased, there were marked changes in the groupings. This is shown in Table 2 and Plate 3.

The proportion of *large* No. 1 grade roots showed a constant increase up to the 6 in. spacing but no further increase in the amount occurred above that figure. With *medium* No. 1 grade roots there was no increase above 2 in. At spacings of 2 and 3 in., the great bulk of the crop (83–91 per cent.) consisted of No. 1 grade roots, but the proportion of this grade was not increased by widening the distance between plants to more than 3 in.

The quantity of No. 2 grade roots fell off sharply at spacings above 1 in., but no matter how wide the spacing, it did not fall below 8 per cent. of the total crop.

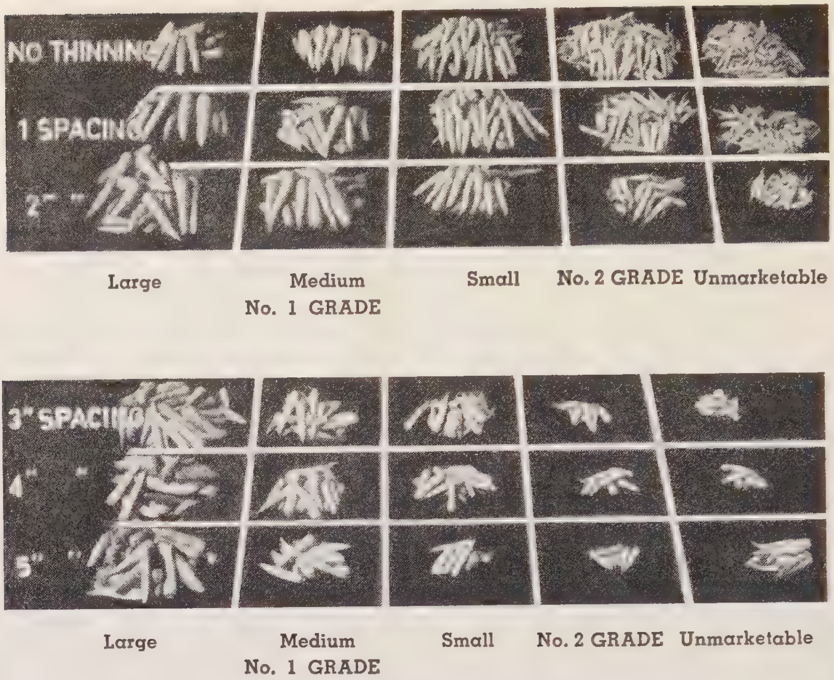

NO THINNING
1" SPACING
2" "
Large
Medium
Small
No. 2 GRADE
Unmarketable
No. 1 GRADE
3" SPACING
4" "
5" "
Large
Medium
Small
No. 2 GRADE
Unmarketable
No. 1 GRADE

Plate 3.

Effect of Plant Spacing on Proportions of Carrots in Various Size Groups.

Number and Weight of Carrots

As distance between plants was increased, there was a rapid decline in the number of roots per unit area (Table 3), but there was not a correspondingly marked change in total yield. By increasing the distance between plants from 1 in. to 2 in., the number of roots was decreased by about 30 per cent., but the weight of roots harvested remained much the same. Similarly, although a 5 in. spacing involved a reduction of 70 per cent. in the number of roots as compared with a 1 in. spacing, the weight of roots harvested only decreased about 33 per cent.

The data in Table 3 serve to emphasise that at the closer spacings (1 to 3 in.), there was an increase in

TABLE 2.

Percentage of Carrots in Each Grading.

(Based on numbers of marketable roots.)

Spacing.	No. 1 Grade Roots.				No. 2 Grade.
	Large.	Medium.	Small.	Total.	
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
0 in. ..	4	12	33	49	51
1 in. ..	8	15	38	61	39
2 in. ..	26	27	30	83	17
3 in. ..	42	27	22	91	9
4 in. ..	46	25	21	92	8
5 in. ..	57	19	14	90	10
6 in. ..	60	21	10	91	9
7 in. ..	57	16	13	86	14

TABLE 3.

NUMBER AND WEIGHT OF ROOTS.

Spacing.	Total Marketable Yield.	
	Number/plot.	Weight (lb.)/plot.
0 in. . .	274	58
1 in. . .	213	51
2 in. . .	150	52
3 in. . .	108	47
4 in. . .	88	40
5 in. . .	66	34

root size with each increase in spacing. This was not evident at the wider spacings of 4 in. or more.

Effect on Root Quality

Size of root was more affected by spacing than any other factor. Though large roots had the coarsest appearance, they were not noticeably more fibrous in texture nor less palatable than smaller ones. However, market comment was to the effect that though large (9.1 oz.) and medium (5.9 oz.) No. 1 grade carrots were attractive in appearance, small (3.8 oz.) roots in this grade were generally preferred by buyers.

Large No. 1 grade roots showed a greater tendency to splitting than medium and small No. 1 grade roots but, under the favourable growing conditions which existed throughout the period of the experiment, this was not a major fault in the crop. With wide spacing between plants, top growth was mostly of the spreading type and the roots were therefore not particularly suitable for the bunch trade.

The effects of different spacings on root size are illustrated in Plate 3. An undesirable feature which showed up in carrots grown at the wider spacings was the greater development of lateral, fibrous roots. These tended to coarsen the carrot and their removal at harvesting added to the labour of preparing the product for market.

Close spacing, such as occurs in an unthinned crop, was responsible for a small proportion of malformed roots (Plate 4).

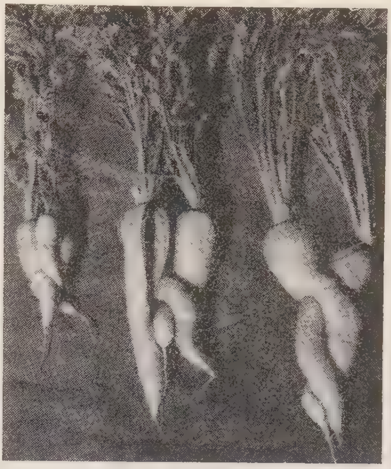


Plate 4.

Twisted Roots: An Effect of Overcrowding in the Row.

Application of Results

It has been shown that, within certain limits, spacing within the row determines the size of the carrot roots at harvest. If the grower decides to market as many *large* carrots as possible, his crop should be thinned to a 3 in. spacing. The adoption of a wider spacing will give a greater proportion of large No. 1 grade roots but yield will be reduced.

If market demand is for a *medium* sized No. 1 grade carrot, the greatest yield will be obtained by thinning to 2 in.

For the pre-package and frozen trade, *small* No. 1 grade and No. 2 grade carrots may be the most acceptable. In this case, maximum yield is obtainable by leaving the crop unthinned.

These results were obtained in a friable red-brown clay loam soil, using Topweight as the indicator variety. In other soil types and with a different type of carrot, results may differ somewhat from those reported here.

Orchard and Garden

IT'S not safe to use the weedicide Delapon to control couch grass in pineapple plantations. Even at weak strengths, Delapon will cause pineapple leaves to wither and die from the tips if it gets on them. Fruit and young suckers have been affected several months after the weedicide has been used.

The property of Delapon to injure pineapples has been proved in trials carried out on the North Coast. Delapon can be taken up through the roots of the pineapple plant, and any attempt to control couch with it in the plantation is extremely risky.

Delapon gives good control of couch grass and some growers have already tried it. Injury doesn't always follow its use, probably because growing conditions at the time of spraying influence its effect. However, the risk involved is considered too great for this weedicide to be recommended.

—R. C. CANNON,
Senior Horticulturist.

PINEAPPLES are grown from slips, suckers, and tops, each individual plant being identical in type with the parent from which it was taken. Characteristics of the parents, bad or good, persist and multiply in their descendants. Obviously the source of planting material decides the quality of your pineapple crop. Improvement? Or deterioration? Which is it to be?

A little time spent on plant selection will repay you many times. Collar of slips is the main defect in pineapples. You know that only too well; and there are others, such as Long Tom and Bottle Neck and dry fruit. And the odd plants which remain sickly, lack vigour, or sucker poorly; it would be unwise to perpetuate these!

Start your selection programme when a plant crop is maturing summer fruit. Mark with bright paint any plants with any of the faults mentioned. Later, gather planting material only from the superior, unmarked units. Repeat the plan in each summer plant crop. Select and eliminate. Aim for quality and maintain it.

—D. DOWDLES,
Assistant Adviser in
Horticulture.

Pasture For Walloon Farm

"K.B.", of Walloon, requires a pasture mixture suited to his farm. The area is a flat; it has a light soil, and about half of it could be irrigated.

Answer: When the area is prepared and has a good seed bed, a mixture such as that set out could be planted from about January to March:

H1 rye grass	2 lb./acre
Paspalum	6 lb./acre
Phalaris arundinacea (Reed canary grass)	2 lb./acre
Cocksfoot	2 lb./acre
New Zealand certified white clover	2 lb./acre

An application of two bags of a complete fertilizer mixture at planting time would be very beneficial. In later years this should be changed to one bag of superphosphate to the acre.

Spray will correct iron deficiency in pineapples

By **E. L. HASTIE, Adviser in Horticulture.**

THE leaves of a healthy pineapple plant are deep-green in colour, with a reddish flush. Variations from this typical colour are therefore a useful indication of nutrient deficiencies or an unbalanced supply of the nutrients needed for normal growth.

The elements needed for plant growth may be divided into two groups, the major elements and the trace elements. The terms "major" and "trace" do not indicate the importance of particular elements but rather the quantity required by the growing plant. The major elements are carbon, hydrogen, oxygen, phosphorus, potassium, nitrogen, sulphur, calcium, and magnesium. The trace elements include iron, manganese, copper, zinc, molybdenum, and boron.

The first three of these elements, namely carbon, hydrogen and oxygen, are obtained from the air and from water in the soil. The remainder of the "major" elements and also the "trace" elements have to be absorbed from the soil through the root system of the plant.

Availability of Iron

Iron occurs in most soils, mainly in the form of oxides which are largely responsible for the characteristic red and brown colours in some types of soil. There is usually more than sufficient iron in the soil to supply the needs of the plant but, at times, much of it is insoluble and cannot be absorbed through the roots. The shortage of soluble iron may be due to a number of causes such as high acidity or interaction of other elements with the iron salts in the soil.

Iron is necessary for the formation of chlorophyll, which is the green colouring matter in the leaves of the plant. If insufficient amounts of this element are taken up by the plant, the young leaves become pale and yellow instead of the normal green colour, and do not function properly. The yellow colour in the leaves is usually termed chlorosis. In extreme cases of iron deficiency, the foliage may be almost completely bleached, while in less severe cases the chlorosis may exhibit a mottled pattern.

Iron salts in the plant tissues are relatively immobile and a shortage in the young leaves cannot be made good by reserves elsewhere in the plant. For this reason, iron deficiency symptoms first appear in the younger leaves. This is the reverse of nitrogen deficiency symptoms, which show up in the older leaves before abnormalities can be seen in the growing point. In this case, nitrogen compounds in

Plate 1.

Plant Crop of Pineapples. It should produce a good commercial crop of more than 20 tons an acre. When iron deficiency symptoms are not promptly corrected, yields will be much less.

the mature leaves move to the younger ones and so the growing point remains green.

The fruit of pineapple plants suffering from an iron deficiency are orange-red, rather than yellow, in colour when ripe and usually do not "fill-out" satisfactorily. The tops show the normal leaf symptoms of an iron deficiency, that is, yellowing of the central heart leaves. The outer basal leaves of the top may, or may not, be a normal green colour; this depends on the extent of the deficiency.

In most pineapple areas where iron deficiency symptoms occur, the disorder is due, not to a natural shortage of iron in the soil, but to its immobilisation by manganese. These soils are, in fact, rich in iron and have a pronounced red colour. However, they also contain an excess of manganese salts which interact with the iron salts in the soil to produce insoluble compounds which cannot be taken up by the plant.

Manganese

Manganese, like iron, is present in most soils and the form in which it occurs influences its availability to the plant. A deficiency of manganese is comparatively rare in pineapple-growing areas but an excess has been recorded in certain types of red-brown loams in the Mary Valley near Gympie, at Yeppoon near Rockhampton, Coolabunia in the South Burnett, some areas near Nambour and at Brookfield.

Manganese-induced iron deficiency in pineapples is very pronounced in the Mary Valley, where sizeable deposits of manganiferous ore occur. Some of these deposits have been mined in the past.

The distribution of manganese in the soil, however, varies greatly from farm to farm, even within the one district. It is therefore not surprising that the incidence of iron deficiency induced by excess manganese in the pineapple crop is also highly variable.

Treatment

Symptoms of iron deficiency in the pineapple plant can be quickly corrected by supplying this element in foliage sprays applied directly to the leaves. The active ingredient in such sprays is usually ferrous sulphate or, as it is more commonly known, sulphate of iron. The usual concentration is a 3 per cent. solution which can be prepared by dissolving 1 lb. of iron sulphate in a knapsack spray full of water (usually 3½ gal.). If a power spray outfit with a 100 gal. vat is used, the amount of iron sulphate per vat is 30 lb.

The iron sulphate spray is applied as a fine mist, which gives a much better cover than a coarse spray. Furthermore the mist spray reduces the risk of burning since a smaller volume of the solution is used and there is less possibility of droplets coalescing and running down the leaves into the tender heart of the plant. Where this occurs, severe burning may result.

The amount of spray required per acre of pineapples depends largely on the size of the plants. In a plant crop, however, about 30 gal. an acre should give a satisfactory cover. When applying the spray, the operator moves at a rapid walking pace along the plant row.

The colour and general appearance of the plants is probably the most reliable indication of the need for treatment. On soil types where iron deficiency symptoms have been recorded in previous pineapple crops, the plants should be sprayed whenever there is any indication of yellow colour in the younger leaves or a lack of response to good growing conditions. The actual number of sprayings and the times of application will vary from district to district according to the soil type. In the worst affected areas, however, spray applications are needed at monthly intervals during the summer months when the plants are making rapid growth.

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Veterinary Course

An inquiry has been made: "Could you please tell me if it is possible to take a veterinary course by correspondence and if so where to obtain the particulars of the course? If this is not possible, would it be possible to learn something of veterinary work without attending university?

Answer: It is impossible in Queensland or in fact in any of the States of Australia to obtain instruction leading to the degree of B.V.Sc. by means other than full attendance of matriculation studies at an approved university. In this State and any other States in Australia, it is impossible now to commence practice without qualifying B.V.Sc.

The Agricultural High School and College, Lawes, does include items dealing with animal health and treatment of common diseases in its curriculum and in addition does hold various short term schools for farmers and others at which these subjects are touched on. Possibly other information could be obtained from the Principal, and the Adult Education Supervisor.

The Technical College runs a course for meat inspectors and details of this could be obtained through the Education Department.

The Farm Family

Our Children's Happiness

A HAPPY child is the child of parents who, through their understanding, set his small feet firmly on the road to a life successful in its best and widest sense.

To understand children, we must realise that they are NOT all alike; that each is an indivdual in his own right. Differences in make-up call for individual guidance and special opportunities.

However, there are certain basic needs that all children share; needs that must be fulfilled if they are to enjoy their birthright of happy childhood. Here are some of those needs, which call for the finest in parenthood.

Children Need Love

Love to a child is what sunlight is to a flower.

Authorities today agree that children are not "spoiled" by too much love, but by too little. The little one who feels neglected and unloved often becomes the "brat" whom everyone dislikes.

On the other hand, the youngster who is loved, and knows it, develops into a well-adjusted person with a minimum of eccentricities. Show a child love and give him praise.

However, we must beware of some of the mistaken ideas of love. The possessive mother, for instance, who clings to her child and deprives him of the society of others, is harming the one she professes to love.

Neither is it love to shower a child with material possessions you were unable to have in your childhood. And loving a child only when he brings prestige to the family is only personal gratification.

To love children for their own sakes, and freely show them that love, is to help them thrive in spirit and grow into people to be proud of.

Children Need Play

Never think of children's play as unimportant. To them it's serious business; the vital business of expressing themselves, of developing physically and mentally.

Children need to adjust themselves, to sort themselves out through play. They bring out their fantasies and work off their hostilities. They develop physical skill and strength, and exercise their boundless imagination.

For healthy, happy play, these are some of the things children need:—

To romp sometimes with their parents.

At other times (except where play is dangerous or unfair) to play without adult interference.

To have playmates, so they can learn to get along with others.

To be allowed to imitate their parents in the jobs they do about the house.

To be allowed to play with water and sand.

Harmless to health, these give valuable scope to a child's self-expression.

Don't make the mistake of thinking that children can't play properly unless they have expensive toys. Their imaginations can work wonders with the most humble household objects.

Children Need Discipline

We must draw the line between wholesome freedom and allowing children to do as they like. It's most important for youngsters to learn early that there are certain limits in behaviour.

There are two very strong reasons for this. One is to protect the child against the physical dangers that unrestrained activity can lead him into. The other is to prevent him from making himself unacceptable to other people, and so creating a life-long obstacle to his happiness.

It is most essential to a child's happy social adjustment that he learns to respect other people and their possessions. The example of parents is his best teacher in this.

Nothing is so necessary to wise discipline as consistency on the part of the parents. Don't let your mood of the moment colour your attitude to a child. Always try to be just, and if you say you will or will not do a certain thing, keep your word.

Understanding children is a full-time job that calls for a lot of conscious effort. But even when things seem difficult, keep before you the shining goal of your child's future happiness.

To help you to a better understanding of your children, ask for Queensland Health Education Council Radio Talks on the following subjects:—

"Controlling Children," "The Perfect Child," "Children and Eating," "Doting Mother—Jealous Child," "Lonely Children," "Child's Personality," "Children's Fear," "Father and Child." Ask also for Free Booklets on Sex Instruction.

—Contributed by Queensland Health Education Council.

Nature Note

A STATE-WIDE drive to enlist the support of all Queenslanders in conserving native plants and animals is paying off. This is shown by increased inquiries from intending hunters, trappers, naturalists and tourists for advice on protected animals and hunting seasons.

Special care has been taken by Government organisations to familiarise migrants with protected plants and animals in Queensland. Conservation of native plant and animal forms an important part of the migrant education classes and a coloured pamphlet showing some typical native animals and plants is distributed to new Australians by the Department of Education.

The drive, however, has not been directed solely at new Australians. Regular lectures, film evenings, posters and a Royal National Show exhibit are arranged to point out to the whole community that native plants and animals are a national asset. Commonsense conservation aims at protecting the rare, the beautiful and the useful, as well as obtaining a continuity of income and sport from the species having economic and sporting values.

It is planned to continue the drive to make Queenslanders more conscious of the need to conserve the State's plants and animals. Success in conservation hinges largely on the co-operation of the public, and this co-operation can be expected only when the public is kept well informed.

—C. ROFF, Fauna Officer.

Tomato time is any time

Tomatoes, red ripe, and fresh from summer vines . . . tomatoes green for pies, pickles, and other good dishes after the first light frost of autumn . . . tomatoes for winter and early spring "put up" plain or in juice, catsup, chilli sauce, relishes, marmalades . . . The calendar round, tomatoes add their special note of bright colour, tempting flavour, and vitamin value.

Cooked Tomatoes—Ripe or Green

Stewed Tomatoes.—Remove stem ends and quarter 6 medium-sized ripe or green tomatoes (peel ripe tomatoes, if preferred). Add 1 tablespoon minced onion for flavour, if desired. Cover and cook until tender—10 to 20 min. for ripe tomatoes, 20 to 35 for green. Add a little water to green tomatoes, if needed.

Season with 1 teaspoon salt; a little pepper; sugar, if desired—½ teaspoon for ripe tomatoes, 1 tablespoon for green—and one tablespoon fat. For variety, add ½ cup soft bread crumbs before serving or top with toasted bread cubes. Six servings.

In the Main Dish

Curry of Meat with Green Tomatoes

1 onion, sliced
3 tablespoons meat drippings or other fat
1 quart sliced green tomatoes
3 cups chopped, cooked meat
1 to 2 teaspoons curry powder
salt.

Cook the onion in the fat. Add green tomatoes, cover, and cook until tender. Add meat and heat thoroughly. If the mixture is too thick, thin it slightly with meat broth, gravy, or water. Season to taste with curry powder and salt. Serve with flaky boiled rice or noodles. Six servings.

Luncheon . . . Supper Dishes

Savoury Rice With Tomatoes

Cook ¼ lb. diced bacon until crisp, remove from fat, and drain. Combine 2 tablespoons of the bacon drippings with 3½ cups tomatoes, ¼ cup each of chipped green pepper and onion. Bring to boiling, add about 3 cups cooked rice, cook 10 to 20 min., or add 1 cup uncooked rice and 2 cups water, and cook gently 40 to 45 min. or until rice is tender. Add more water if mixture becomes dry. Season with salt and pepper. Add bacon. Six servings.

Salad Suggestions

Combine diced tomatoes, cooked beans, chopped celery, chopped pickle or pickle relish; season with minced onion, salt, and pepper. Moisten with salad dressing.

Arrange alternate slices of tomato and cucumber; or tomato, avocado, and grapefruit sections on lettuce or other salad greens. Serve with salad dressing.

Combine diced tomatoes, diced, cooked potatoes, top with several pieces of cooked asparagus. Serve with salad dressing.

Some favourite salad combinations are: sliced tomatoes and cucumber with cottage cheese; diced tomato, celery, radishes, cucumber, scallions or green onions, and lettuce; chopped tomato and shredded cabbage; diced tomato, raw spinach, onion, and grated carrots. Serve with your favourite salad dressing.

Tomato Juice, Soups, Sauces

Tomato Juice Cocktail

3½ cups fresh or canned tomatoes
1 cup chopped celery
¼ cup chopped green pepper
½ bay leaf
1 tablespoon chopped onion
½ teaspoon salt
1 teaspoon Worcestershire sauce
½ teaspoon horseradish if desired.

Cook together the tomatoes, celery, green pepper, bay leaf, and onion—about 20 min. for fresh tomatoes, 10 for canned. Press through a sieve. Add salt, Worcestershire sauce, and horseradish to sieved tomatoes. Chill. Mix well before serving. Makes 3 cups.

Cream of Tomato Soup

3½ cups fresh or canned tomatoes
¼ cup chopped onion
2 tablespoons fat
3 tablespoons flour
½ teaspoon sugar, if desired
3 cups milk
1 teaspoon salt.

Cook together the tomatoes and onion—about 20 min. for fresh tomatoes, 10 for canned. Press through sieve. Melt the fat; blend in flour and sugar (if used). Gradually add cooled, sieved tomatoes. Cook over low heat, stirring constantly, until thickened. Gradually add tomato mixture to milk, stirring constantly. Heat slowly to serving temperature. Add salt. Serve at once. Six servings.

Tomato Sauce

2½ cups fresh or canned tomatoes
¼ cup chopped onion
½ teaspoon sugar, if desired
¼ bay leaf
2 cloves
Flour
Fat
½ teaspoon salt
Pepper.

Cook together the tomatoes, onion, sugar (if used), bay leaf, and cloves—about 20 min. for fresh tomatoes, 10 for canned. Press through a sieve and measure. For each cup of sieved tomatoes, blend 1 tablespoon flour and 1 tablespoon melted fat; gradually add the cooled, sieved tomatoes. Cook over low heat, stirring constantly, about 5 min. or until thickened. Season with salt and pepper. Serve over meat or vegetable loaf, croquettes, fish, cooked spaghetti, souffle, or omelet.

For variety, brown lightly in the fat 1 cup sliced mushrooms before blending fat with the flour. Or for a main dish, add cooked meat balls to the sauce and serve over cooked spaghetti.

Tomato Relish

Catsup

2½ quarts (15 to 17 medium-sized) sliced tomatoes
¾ cup chopped onion
3-in. piece stick cinnamon
1 teaspoon whole cloves
1 large garlic clove, chopped
1 cup vinegar
½ cup sugar
1¼ teaspoons salt
1 teaspoon paprika
Dash cayenne pepper.

Simmer together tomatoes and onion for 20 to 30 min.; press through a sieve. Put the cinnamon, cloves, and garlic loosely in a clean, thin, white cloth; tie top tightly; add to vinegar and simmer 30 min. Remove spice bag. Boil tomato mixture rapidly until you have but one-half the original amount. Stir frequently to prevent sticking. Add spiced vinegar, sugar, salt, paprika, and cayenne pepper to tomato mixture. Boil rapidly, stirring constantly, about 10 min. or until slightly thickened. Pour into hot, sterile jars, fill jars to top, and seal. Makes about 2 pints.

The Good Chairman Does This...

By J. PARK,
State Organiser, Junior Farmers.

EACH junior farmers' club is required to conduct regular meetings over which the club leader, in his capacity as chairman, presides, and at which the members make plans and decide how best they may carry these out. The meetings can only be successful if they are well run and the discussions are intelligent and regulated to the business in hand. Matters are made easier if the rules of procedure are known and thoroughly understood by the chairman, for it is his duty to guide the meeting in such a way that the greatest amount of business is done in a reasonable time. He must also do what he can to make certain that those who attend leave the meeting satisfied that useful work has been done; that they have had the opportunity to express their views and to vote according to their opinions; and that information to which they were entitled was not withheld.

Preliminaries.—The chairman is responsible for convening meetings, though in this he will follow the wishes of his executive committee and the instructions, if any, of the general meeting, that is, of the club. The actual summoning of the members, by sending out notices, is the duty of the secretary. The chairman must fully understand the business that has to be done at the meeting, and he should go through this with the secretary when the agenda is being drawn up prior to the meeting. Such collaboration is essential to good management. It is also wise, just before the meeting, to go through the agenda again and to discuss with the secretary any matters that have arisen recently. The chairman must, therefore, arrive at the meeting-place in advance of the time of the opening of the meeting, and the other officers should do the same.

The chairman should begin the meeting exactly at the time stated in the notice convening the meeting, unless there is some very good reason for doing otherwise. If the attitude of "give them a few minutes more" is regularly adopted, the latecomers will not improve their manners, and those who are punctual will resent the waste of their time. By being punctual himself, the chairman sets the club an example of courtesy and good sense.

In taking his place in the chair, the chairman declares the meeting open, saying, "Order please, ladies and gentlemen, I declare this meeting open."

The chairman remains seated during the meeting unless he wants to make a speech, present a report, introduce a speaker or make a special announcement.

Items on the Agenda.—The first item on the agenda is the acceptance of any apologies for absence; then follows the reading of the minutes. The minutes must be those of the last meeting of the same body of people as is then assembled. The chairman then asks the meeting if the minutes are correct.

It is usual to ask for a resolution (motion) "That the minutes as read be confirmed."

This resolution can only be moved and seconded by members who were actually present at the meeting concerned. If the meeting approves, the chairman signs and dates the minutes.

If the meeting, after proper discussion, passes a resolution amending or altering the minutes, because they are not a correct record, the secretary makes the necessary alterations, the chairman initials these, the corrected minutes are then accepted by the meeting, and the chairman signs and dates them. The minutes must never be altered except on grounds of inaccuracy.

Business arising from Minutes is the next item on the agenda. It is at this stage that discussion is permitted on matters dealt with in the minutes. It is not unusual for most of these matters to be the subject of reports given by the secretary or other members. It is the responsibility of the chairman to ensure that these reports are prepared.

Reports.—There is much confused thinking about the presentation of reports. Formal reports have to be "received" by the meeting before they can be discussed.

The member responsible for presenting the report moves a resolution, "That this report be received"; this resolution must then be seconded.

It should be made clear that in receiving a report the meeting does not necessarily approve of all that it may contain. When the report has been received it can be discussed clause by clause if necessary. It may or may not be amended (altered), but when discussion is at an end it is put to the meeting for "adoption" either in its original form or as amended. If the resolution calling for the adoption of the report is seconded and voting is favourable, the body of members then meeting becomes responsible for the report. If it is not adopted it may remain as merely "received," or it may be "referred back" to those who drew it up to try again.

Resolutions.—When a suggestion that something should be done is laid before a meeting, the suggestion is called a "motion." If the meeting decides to follow the suggestion the motion is passed and becomes a "resolution." A motion must be worded as an *affirmative* and not as a *negative.* This means that the motion must say that something *should* be done, rather than that something should not be done. Every motion begins with the word "That——." No motion that has been passed or rejected may be discussed again at the same meeting.

Every motion must be proposed and seconded before it is debated. If there is no seconder, the motion cannot come before the meeting for discussion.

No really important or difficult matter ought to be settled by a meeting unless the members have had a chance to think about it beforehand. The chairman is acting within his rights if he refuses to allow an important motion, not on the agenda, but brought up under "any other business," to be voted on. He may, however, allow it to be discussed. If the chairman is in doubt about permitting discussion on such a motion, he should seek the view of the majority of members as to the desirability of treating the motion "as a matter of urgency."

Debate.—The chairman must insist that every speaker "address the chair." This means that all must speak to him (or her) and not across the room to other members. If members wish to ask questions, they must be directed "through the chair."

Naturally only one person may speak at a time, and if two members who wish to speak rise to their feet at the same time the chairman has to decide who will speak first. The other person must be allowed to speak next.

In an orderly meeting, no one stands up if the chairman is addressing the meeting, except to raise a "point of order." Also, if the chairman stands up, the speaker must sit down.

It is the chairman's job to keep speakers to the point. Everyone's time is wasted if a speaker talks about matters which do not concern the item under discussion, or if he repeats himself.

The chairman needs tact and good humour to keep the meeting orderly and harmonious and to get the business done briskly.

Hints For Club Members

Many clubs have considered building their own club rooms. Members of the recently-formed club at Mt. Ossa, near Mackay, have almost completed theirs. If you are interested in seeing their plans and specifications, and finding out how they raised the necessary finance, write to the club secretary, "Silent Grove," Mt. Ossa, via Mackay.

It pays to review your club's programme every three months. If it is not catering for the needs and the interests of members, make some radical changes in it. But remember this, you will benefit from your junior farmers' club only in so far as you take an *active* part in its affairs. Decide upon an interesting and beneficial programme, then *work* to make it succeed.

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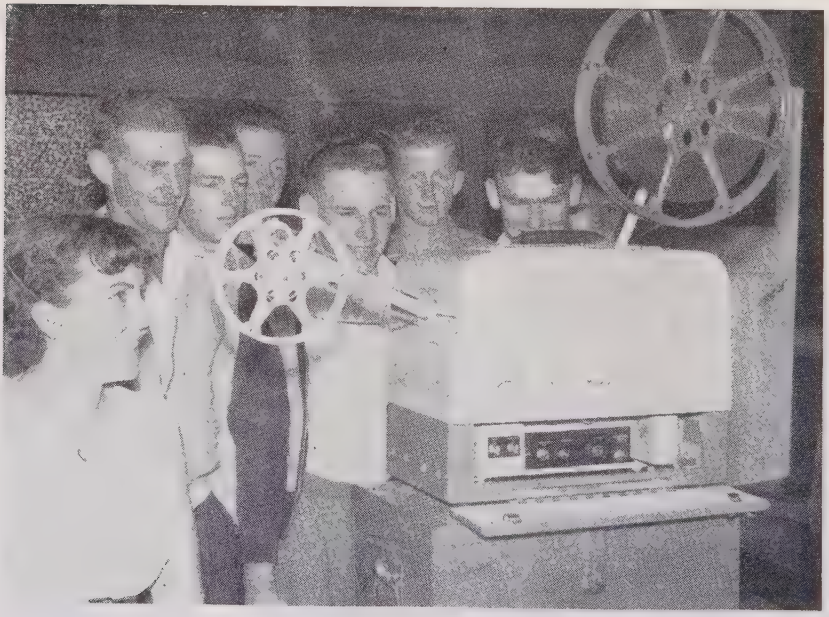
Educational and Entertaining



WHEN the mobile film unit visited Miriam Vale, these junior farmers found interest in the projection aparatus as well as in the screening of films.

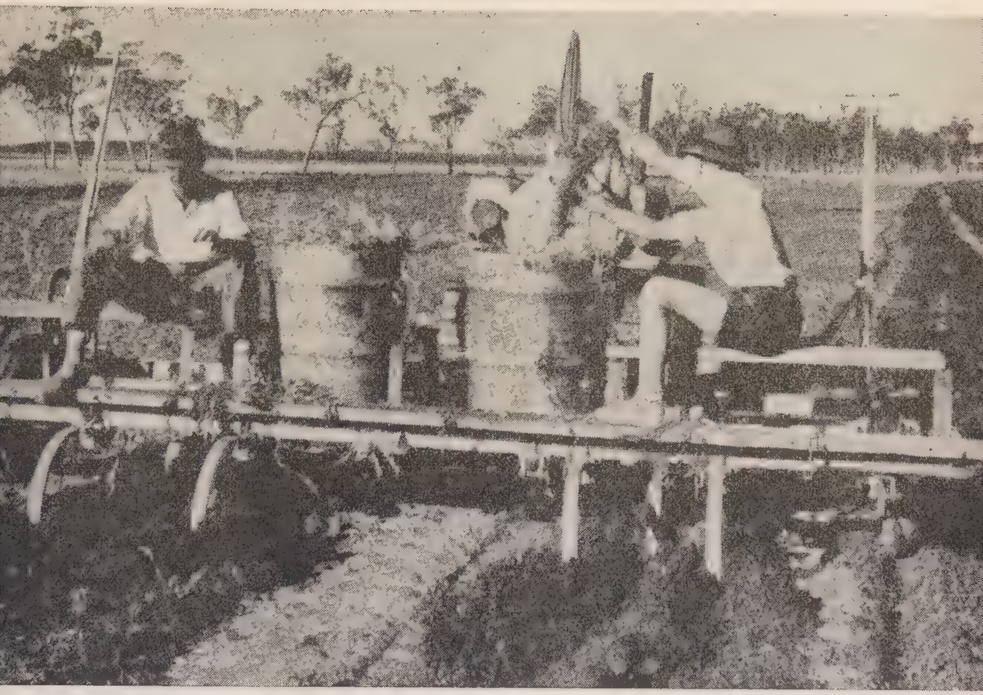


Plate 1: Dropping African Star Grass Roots into Open Furrows made by Built-Up Duck-Feet on Tines on the Second Bar of Chisel Plough.

Chisel Plough Plants Grass Roots

By R. F. S. KELSEY, Soil Conservation Officer.

THE planting of grass root cuttings can now be done mechanically without any great expense or effort. Mr. Ron Wall, of Jimbour Road, Dalby, proved this when he planted African star grass on more than 6 ac. of drainage line in less than 6 hours.

The grass was planted through a trailing chisel plough from which most of the tines were removed. Two rows 6 ft. apart were planted at a time. Four tons of planting material were used.

Need for Root Grasses

It is often necessary to plant a grass that will spread rapidly over the ground, providing early protection of the soil. Such conditions exist in drainage lines, in waterways, and on steep or eroding hillsides. Few of the grasses normally established from seed are suitable for this purpose. Some do not provide a sufficiently "close" ground cover. Others are too "bulky" and in drainage lines on flat country may hold water back, forcing it in a different direction and causing erosion in areas not prepared to carry runoff flows.

Some of the most suitable grasses for the purpose can be established only by roots. Kikuyu has proved its worth on numerous occasions. African star grass is proving ideal under drier conditions. Both these grasses have excellent soil-holding properties. The star grass offers little resistance to the passage of water, allowing it to pass over freely, which is a very desirable feature. Both grasses are nutritious and palatable.

While African star grass is always likely to cause prussic acid poisoning, feeding trials carried out at Rockhampton and Biloela by the Department over a number of years have not resulted in any stock losses. It should be realised, however, that this grass, like the sorghums, must always be regarded as a possible danger.

Kikuyu and African star grass are both established from roots or runners.

In the past, only limited use has been made of these grasses because of the amount of labour required to plant the roots. Now, Mr. Wall's successful experiment has shown that this work can be done mechanically with improvised equipment.

Departmental officers elsewhere are carrying out trials with a modified Bermuda sprig planter which is specially designed for planting grass roots, and eliminates the need for labour to drop the roots. However, Mr. Wall has shown what can be done by using conventional farm equipment.

Machinery Used

The equipment used was a standard chisel plough and the modification was very simple. The chisel plough used had three rows of tines. Only two tines were left in the front row. These were located 6 ft. apart (each 3 ft. off the centre line of the machine). They were fitted with chisel points.

In the second row, there were again only two tines used. These were located immediately behind the tines in the front row. These tines were fitted with 16 in. duckfeet. The duckfeet each had two plates 7 in. by 8 in. welded in an upright position along the cutting edges. These plates formed two sides of a box which opened up a furrow. They acted like a small "middle buster" plough. On the third cross-bar of the chisel plough, and immediately behind each of the built-up duckfeet of the second row, two tines were located, one on each side of and about 1 ft. off the centre-line of the second row duckfeet. These were fitted with standard duckfeet (Plate 1).

Planting the Roots

On the top of the frame, two cut-down 44 gal. drums were used to hold the grass roots. Seats were improvised for the comfort of two men who dropped the roots on to the wet soil bottom exposed by the built-up duckfeet.

The dropping of the roots into the right position behind the duckfeet was simple and the task did not prove tedious.

The roots were effectively covered by the two following duckfeet.

Function of Planter

The two leading chisel points just broke the ground for the built-up duckfeet which followed immediately behind.

For three-point-linkage chisel ploughs, or any implement in which only two rows of tines are available, the front "opening" chisel points need not be used. This would leave the front row carrying the built-up duckfeet and the following row with the "covering" duckfeet.

Alterations and Improvements

Many alterations and improvements to this arrangement are possible.

For further planting Mr. Wall would weld a plate, possibly 12 in. by 3 in., on to each of the covering duckfeet so that they would pull in more soil to cover the roots. It is also possible that better results would be obtained if smaller duckfeet were built-up for the furrow opening as these might penetrate deeper into the wet soil and not disturb as great an area as the 16 in. duckfeet.

Rolling

Rolling is an all-important part of the operation, especially if dry conditions are experienced after planting. Mr. Wall spaced his rows so that the rubber tractor wheels would cover the planted rows. These rows were rolled with the tractor tyres and with a field roller the day after planting.

Conditions at Planting

The planting at Mr. Wall's was done in a heavy black soil. There was reasonably good soil moisture Following the planting, however, extremely hot and drying conditions prevailed. No rain fell from the time of planting (October) until 2nd December, 5½ weeks later.

Temperatures during the week following planting daily exceeded the 100 deg. mark and reached 108 deg.

Results of Planting

Because of the hot, dry conditions which followed the planting it was not anticipated that the roots would survive. However, the results have been very good. In sections where the ground was loose, giving satisfactory planting conditions, a good emergence of grass was obtained and a quick cover seems assured. Elsewhere the results were patchy but sufficient grass appears to have emerged to ensure a cover over most of the area. At the last inspection, new shoots of grass were appearing and the results of the first good rain on this plot will be watched with interest.

There is no doubt that the retention of soil about the roots of the planting material greatly assisted the grass under the adverse conditions.

Advantages

The advantages of this method of planting are:

1. The arrangement of equipment is simple and inexpensive.

2. More than 1 ac. an hour can be planted. A wider spacing of rows would allow greater coverage.

3. The planting is not arduous or tedious—the great objection to the manual planting of roots.

4. The rooting material is not damaged to any extent and most of the clods dropped retain soil about the roots, which greatly assists the chances of success.

5. Breakdowns are not likely to occur to the simple equipment.

6. The machinery would not be troubled by blockages to any extent even in "dirty" ground as the few tines used give good clearance. However, good preparation to a reasonable depth would greatly improve the chances of success, especially if dry conditions were experienced after planting.

Collection of Roots

The task of collecting grass roots has not been fully mechanised and requires a considerable amount of labour.

The local method of collecting African star grass is to arrange for a farmer in the Bell district who has a large area of the grass to plough it out with a mould-board plough. It is then loaded by hand. Some farmers have found a front-end loader suitable for digging out and loading kikuyu. It is probable that this method could also be used for the collection of African star grass.

Some breaking down of big clods is necessary to simplify planting but the retention of some soil by the roots is desirable.

Costs

The cost of this type of planting varies with the distance to be travelled in order to obtain roots.

In this case, Mr. Wall and two men were half a day collecting the roots and travelling to and from the source of supply.

The cost of the roots was £5 10s. The equivalent of two man-days was used in preparing and planting the material.

The total cost of material, labour and the planting of the grass was about £21, or £3 10s. an acre.

With planting material now available on the farm, any future planting would cost only a fraction of this amount. The work would also be much easier and the chances of success greatly increased.

Practicable

The work done by Mr. Wall has shown that it is practicable to plant large areas to grasses that can only be established from vegetative material. No special equipment is required. The total cost of collection, purchase and planting of the grass was no more than the cost of seed alone for some improved pasture mixtures.

What Strain of Buffel?

"D.J." of Quilpie asks what buffel grass strains would be suitable to plant along bore drains in the area?

Answer: It would be necessary to avoid planting any strain in waterlogged soils as buffel grass is not suited to such conditions. Experience shows that some bore waters are not suited to irrigation purposes because they are too heavily mineralised. However, buffel grass in Western Australia has been seen growing in sands near high water mark and so it may have some tolerance to salt. It would nevertheless be to advantage to have a sample of the bore water analysed before buying seed.

If the water is suitable and the bore drains are not waterlogged, planting any of the following strains may prove satisfactory: Biloela, Gayndah, American, Cloncurry, and perhaps the Western Australian strain.

If the water is heavily mineralised it would be wise to make small trial plantings first.

Evening Primrose

The establishment of a winter-growing pasture for the St. George district is the subject of an inquiry from "A.G.," who seeks information on Evening Pimrose.

Answer: A winter grass such as perennial veldt grass planted during February-March at 1 to 2 lb. per acre should be useful in the area. Although it requires a moisture-retaining soil it grows on poor land. Being a winter-growing species, the winter rainfall at St. George may not always be sufficient for the successful growth of the grass.

A useful legume to grow with the veldt grass is barrel medic or barrel medic strain 173. The spines on this medic are short and should not be troublesome in the wool of sheep. Lucerne could be tried with some certainty of success. With lucerne, however, it is essential to get the plants well established before grazing or the crop will be rapidly grazed out.

Evening Primrose is a cold climate species and is regarded as being suitable for growing on the poorer classes of soils. As it is not a legume it will not have the beneficial effects on the soil associated with leguminous plants. It is green when the summer grasses are dry. Plant during February-March at 1 to 2 lb. per acre.

Cotton Can Pay For Improved Pastures

By K. V. HENDERSON,
Senior Adviser in Agriculture.

FARMERS know that native pastures afford only limited feeding value each season. In times of stress, such as during drought or at the beginning of winter, they let us down quickly.

On the other hand, sown pastures provide well-balanced high quality grazing, and are available for a great part of the year, especially in late winter and spring when rainfall is normal or slightly above average. They are also economical because they are perennial and apart from the initial cultivation required in establishment, annual chisel plough renovation may be all that is necessary for a number of years.

Nearly every dairy farm in the State has some land unsuitable for frequent cultivation. This would be best employed in growing improved pasture. Much of the existing native grass on this type of soil is thin, weedy and low in productivity. It is possible to restore the productivity of these grasslands by inexpensive methods.

Plate 1.

Cotton Grown Following Grass is Usually Better Suited to Machine Harvesting.

Plate 2.

Good Crops of Green Panic Like This Can Be Obtained on Grassland Following Cotton.

Cotton's Place

In many instances, cotton can be planted on these grassland areas. Then with good cultural practices during the growing season, the physical condition of the soil is greatly improved, pasture weeds are controlled and the land is brought into good condition for re-sowing with improved pastures.

Usually two crops of cotton are required for a complete renovation of the area.

In Queensland, cotton is a crop which enjoys no fear of overproduction for many years to come, and furthermore, a guaranteed price of 14d. per lb. by the Commonwealth Government is assured until the 1962-63 season.

Under normal circumstances, the returns from two crops of cotton would provide good supplementary annual incomes and would finance an adequate amount of grass and legume seed for sowing the pasture.

In the second season under cotton, the cultivator should be used frequently so that after picking operations are finished, two thorough disc cultivations should place the land in good tilth for planting.

Where land is not suited to regular cultivation, the chisel plough can be put to good use by cultivating the area two or three times on the contour during spring and late summer months.

Planting of grasses in central Queensland is usually carried out in mid-January, just before the monsoon rains. Earlier plantings are hazardous, as the young seedlings are apt to be burnt off by the extreme heat in November and December, especially if rains have been light.

Mixtures to Use

Suggested combinations for improved dryland pastures in central Queensland are:

(1) For better class soils—
  - 3 lb. green panic or 5–6 lb. Rhodes grass per acre.
  - ½ lb. phasey bean.
  - 1–2 lb. lucerne.

(2) For sandy loams or poorish soils—
  - 3 lb. buffel grass (Gayndah or Biloela).
  - 1 lb. Townsville lucerne.
  - 2 lb. lucerne.

In the wetter coastal areas of this region, centro is suggested for trial as the legume component in the pastures. This tropical legume is proving versatile and is being grown in wetter coastal frost-free areas from the Daintree to the Currumbin hills.

These combinations are suited to most types of soil other than the heavy alluvial loams. If these loams hold their soil moisture well, or are inclined to be wet, 3lb. per acre of scrobic with centro (1 lb.) and phasey bean (½ lb.) as component legumes should give good results.

Correct Management

Improved pastures should be subdivided into convenient areas according to the size of the dairy herd to be grazed, and according to the area of pasture available. Where a definite pasture-crop rotation is planned, paddocks should be large enough to plough and cultivate for cash crops. Temporary electric fencing will provide a cheap method for confining stock to smaller areas. Rotational grazing protects your pasture, and helps to eliminate selective grazing by individual animals. This is very important where plants of differing palatability are used in a mixture. For example, in a Rhodes grass–lucerne mixture, the

Plate 3.

Rhodes Grass Growing on Old Cultivation.

lucerne would be quickly destroyed under continuous grazing because it is more palatable than the Rhodes grass.

In addition, controlled grazing permits more efficient use of pastures where the available area is limited.

After an area has been grazed to a safe level—no lower than 6–7 in.—the chain harrows may prove helpful in breaking up and distributing droppings over the area, otherwise rank and unpalatable growth will result around a dropping.

It is often not practicable to harrow tussocky type grasses such as green panic and buffel unless they are grazed to a dangerously low level. Harrowing the pastures in which centro is making really good growth is seldom satisfactory.

So here is the story in brief:—

(1) Don't pay rates on unproductive native pastures; plant the area to improved grasses and legumes.

(2) Reduce your production costs considerably by returning old cultivations to pastures.

(3) Grow cotton for two consecutive years to renovate the soil and provide finance for sowing pastures.

(4) Don't flog your pastures—graze them rotationally and give the more palatable plants a chance to recover from the grazing. Like us, pastures require a holiday regularly.

(5) Maintain productivity and palatability by the frequent use of the harrows where the pastures are suitable in order to improve rain penetration and distribution of droppings.

(6) Sound practice—Three or four years grass then two years annual cropping, then back to grass. If you have a good legume in your pastures they will last much longer. Crop rotation pays good dividends.

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Velvet Beans v. Cowpeas

"P.R.," of Caboolture, has inquired about the relative values of velvet beans and cowpeas.

Answer: Both these crops can produce excellent feed and there is little, if any, difference between the two as fodder crops.

All the commercially available varieties of cowpea as susceptible to stem rot. Once this disease has become established in the soil it can destroy a crop of cowpea.

Some stem rot resistant varieties have been produced; these are being grown in seed multiplication plots, and will be released when sufficient seed is available.

The best of the resistant varieties are Malbar, Santiago and Havana.

If cowpeas have been grown on an area for many years, try velvet beans which are not affected by stem rot. As velvet beans are liable to frost, they should not be planted until the danger of frosts has passed. They have a longer growing season than cowpeas.

Machinery for Hay And Silage—III.

By Officers of Agriculture Branch.

Transporting Chopped Fodder.—Chopped materials may be carted from the paddock to the place of storage in farm waggons, farm trailers or farm trucks. All of these are fitted with high sides and ends made of wood, wire netting or sheet steel. Wooden sides may be complete or may be a framework covered with tarpaulins or jute material. Specially built trailers or trucks can be used and these may be side-tipping or end-tipping.

The number of trucks or trailers used to carry the chopped material from paddock to silo depends largely on the quantity to be handled and the labour available. In order to achieve a quick turn-round of trailers, some type of mechanical unloading device is usually employed. Sliding, or conveying the material to the rear of the trailer, is a common practice. End or side-tipping wagons or trailers are also employed in filling pit and trench silos.

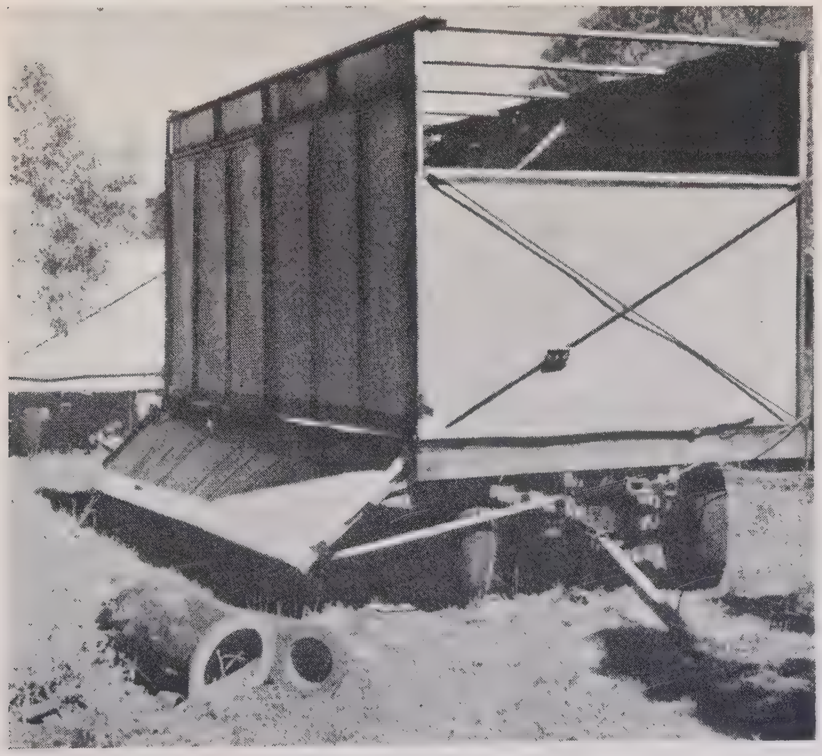

Plate 30.

Side-tipping Trailer, with Apron and Hinged Side Doors. Tipped by Cable Hoist Operating on Side of Trailer Opposite Apron.

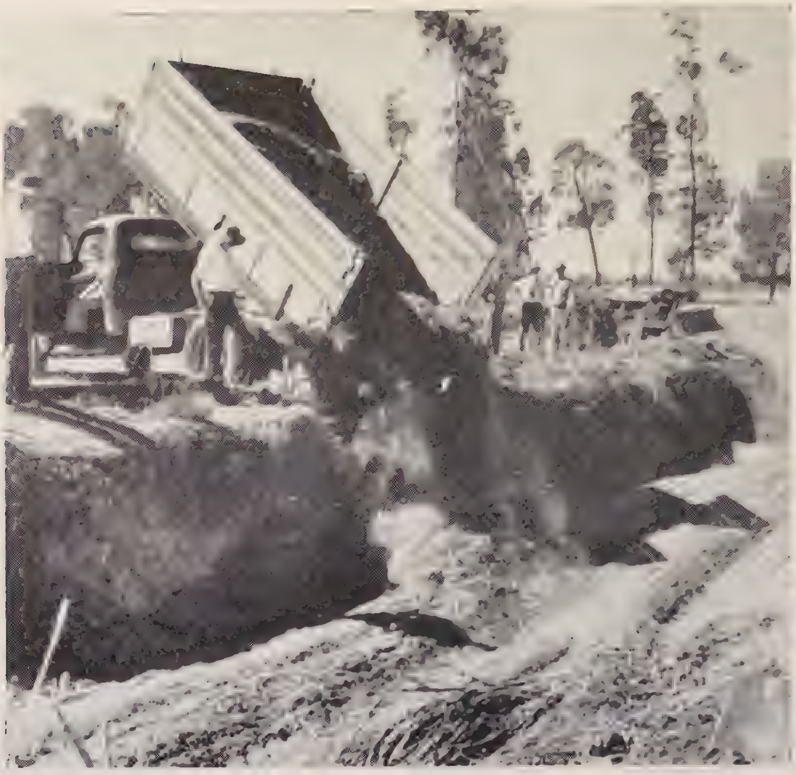

Plate 31.

Conventional Tip Truck with High Sides Tipping Chopped Sudan Grass into a Trench Silo at Yelarbon.

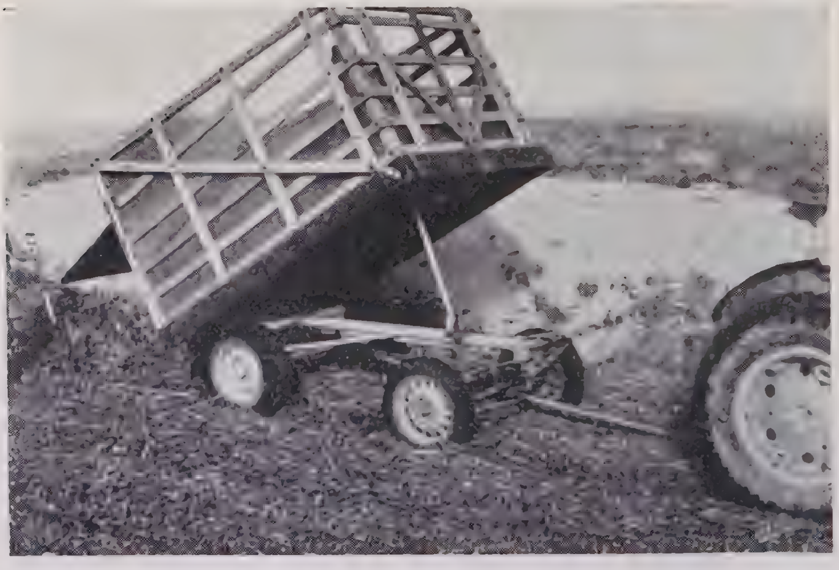

Plate 32.

A Tipping Trailer after Tipping a Load of Chopped Sweet Sorghum in a Trench Silo at Wetherby, near Richmond.

Four types of rear unloading devices for non-tipping bodies are used: (1) the sliding front endgate, (2) the canvas apron conveyor, (3) the endless steel chain and slat conveyor, and (4) the chain wire lining.

The sliding front endgate consists of a movable front endgate attached to cables or chains which in turn are attached to a pipe roller which serves as a winch at the rear of the trailer. Sometimes these cables are attached to a tractor or vehicle which draws the load off more quickly.

The canvas apron conveyor consists of a canvas apron spread on the trailer floor. The rear end of the apron is attached to a pipe roller. As the canvas is wound up on the roller the load is moved to the rear of the trailer.

The endless steel conveyor is similar to a manure spreader apron. It may consist of a single wide conveyor or two narrow conveyors side by side.

The chain wire lining is firmly attached at one end to the rear of the floor of the vehicle. It is wide enough to cover the full width of the vehicle and long enough to cover the full length of the floor and the front wall. A spreader bar is attached to the free front end of the wire. A cable attached to this bar is used to roll the load off the rear of the vehicle.

The sliding front endgate type is the cheapest of the types mentioned above and reasonably satisfactory in performance. The canvas apron is moderate in cost and very satisfactory, but requires a little more care in use to avoid damage. These two types, however, can be easily attached and removed from the trailer.

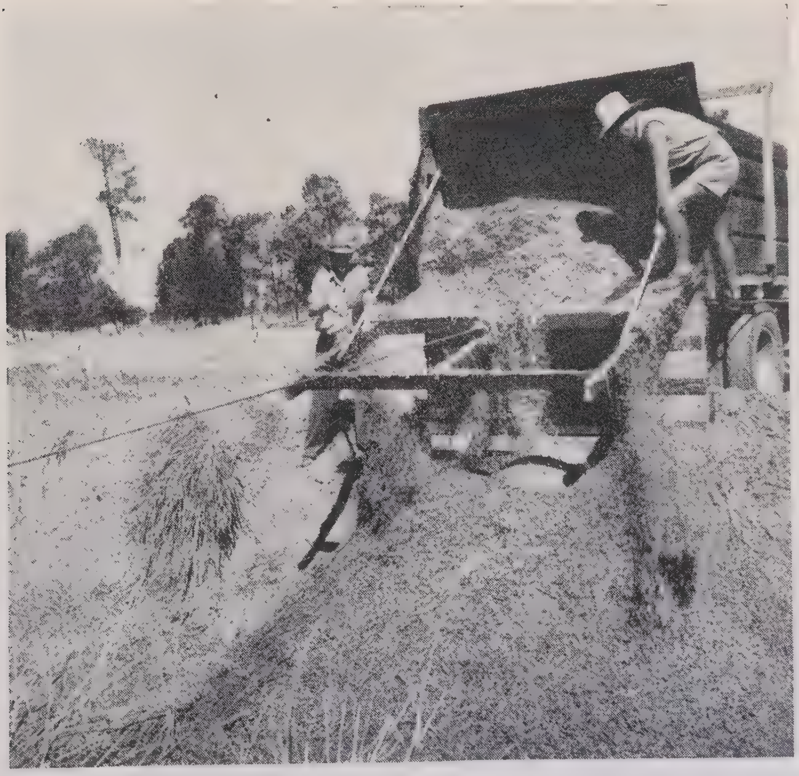

Plate 33.

A False Floor and Front Endgate Hauled off Truck at Side of Trench Silo, Using a Cable Attached to a Land Rover.

Plate 34.

A Load of Silage being Unloaded into a Trench Silo by a Chain Attached to an Anchor Post at the End of the Trench and to a False Front in the Truck Body. The False Front is Attached at Each Corner by Cables to an Old Tyre which Absorbs the First Shock of the Pull of the Cable. This False Front is Guided in Part by Pipe Suspended Centrally over Load.

The endless steel conveyor is more expensive, more durable and more efficient.

The chain wire is relatively cheap to install and if strong enough will give good service. An external source of power is required for this method.

The rate of unloading will vary with the material, size of load and capacity of the blower—5 to 10 minutes per load is common. Unloading into pits or trenches can be accomplished more rapidly.

Table 5 is a useful guide with regard to rate of operation and man-hours per ton for the various methods adopted in the conservation of fodder as hay or silage.

TABLE 5.

COLLECTING AND STORING HAY AND SILAGE.

Method or Equipment.	Haulage Miles.	Crew Size.	Rate per Hour in Tons.		Man-Hours per Short Ton.
			Range.	Average.	
Hand loading—dry hay	½	3	0·7–1·5	0·86	3·5
Sweep rake—dry hay	⅓	2	0·8–1·7	1·1	1·8
Sweep rake—dry hay	⅓	3	1·2–2·0	1·4	2·1
Sweep rake—silage	⅓	1	1·5–2·2	2·0	0·5
Sweep rake—silage	⅓	2	..	2·0	1·0
Sweep rake—silage	½	1	1·2–1·7	1·5	0·7
Hay loader—dry hay	½	2	..	0·9	2·2
Hay loader—dry hay	½	3	1·0–2·5	1·2	2·5
Baler—dry hay	¾	5	to 3·5	2·5	2·0
Forage harvester—dry hay	¾	4	1·5–4·0	3·0	1·3
Forage harvester—silage (grass)	¾	5	3·0–7·5	5·0	1·0
Forage harvester—silage (crop)	¾	6	5·0–10·0	7·5	0·8

Source: Central Experimental Farm, Ottawa.

(CONCLUDED.)

Pasture and Crop

FAILURES with hormone weedkillers can be avoided by using these preparations at the right time and at the right strength. Damaged crops or undamaged weeds suggest a mistake in either mixing or applying the weedkiller.

Modern weedkillers work because you apply them at a rate sufficient to kill the weeds, but not sufficiently heavy to kill the more tolerant crop. The recommendations for using hormone weedkillers are expressed in pounds of active ingredient to the acre, and not as a percentage concentration. This is because the water in the spray fluid is employed only to get a uniform spread.

The important things to know are how many gallons of water to the acre your spray delivers, how many pounds of hormone to the acre are needed to kill the weeds, and the right time to spray. If you're in doubt, consult your local Adviser in Agriculture.

Chemical sprays make easy work of weeding onions. Trials in the last three years have shown that the use of these preparations will halve the back-breaking job of weeding onions by hand.

Until chemical weedkillers became available, a young onion crop needed at least two hand weedings before it was big enough to be cultivated mechanically without the risk of burying the plants. When chemical sprays are used, you can cut the number of hand weedings to a single, very light one.

Common weeds controlled by these sprays are stagger weed, potato weed, dead nettle and carrot weed. If you're interested in weeding onions with chemical sprays, consult your local Adviser in Agriculture. He will tell you the kind of spray to use, the rate of application and the best time to spray.

—*V. J. WAGNER,*
Chief Agronomist.

WHEN a grower harvests a 24-bushel crop of wheat, he removes from every acre approximately the equivalent of 170 lb. of ammonium sulphate, 26 lb. of superphosphate and 12 lb. of muriate of potash.

Fortunately the normal Darling Downs soil is richly endowed with phosphorus and potassium, and it would take many decades of intensive farming before these elements were seriously depleted. In the case of nitrogen, the loss is quite considerable, and over a shorter period of time, would result in the lowering of quality and yield. As nitrogen is an important factor for wheat growing, it is essential that it be maintained at a satisfactory level in the soil.

This can be achieved by following the recommended crop rotations and also by fertilizer application. Information on replacing nitrogen in your soil can be obtained from your local Adviser in Agriculture.

—*W. T. KELSO,*
Senior Cereals Chemist.

AS tobacco leaf is appraised according to its position on the plant and its quality, all farmers should know the descriptions applied to the different kinds of leaf. This will help him in his grading because he knows what to look for when sorting his crop.

Lugs are leaves from the bottom part of the plant. Normally they are thin, dry-natured, dull and open grained. The surface of the leaf is slightly crinkled and feels something like crepe paper. Lugs vary in size—some of them can be quite large, but they all possess the same appearance. The term "lugs" should not be applied only to the thin, dry, trashy leaf from the first pickings. These propably are lugs, but they are only one type. They have been affected by blue mould, insect damage or have been allowed to become overripe before harvesting. Lugs can be very good quality tobacco if harvested at the correct time.

Cutters are from the position above the lugs. They are glossy and very rich in appearance. They are soft and elastic. They show some open grain on the leaf surface. Cutters are the most valuable leaves on the plant.

Leaf comes from above the cutters but below the tips. They are heavier bodied and do not have the lustre and gloss nor the open grain of cutters. They are narrower than cutters and do not have their elasticity.

Subdivision leaf is not a natural group. It is the term applied to leaves from the middle portion of the plant which do not fit either into cutters or leaf. They are thin and can vary from somewhat elastic to dry natured. When the growth of the plant is affected by nematodes or excess water, or the leaf becomes overripe, this thin cured leaf is known as sub leaf.

Tips are from the top part of the plant. They are mostly short and narrow, and generally are heavier bodied than leaf. To be of any value, tips must be very ripe.

Farm grading is done according to the way the leaf was picked. That is, first pickings are graded first and so on, and the texture of the leaf is regarded as the first important point. This divides the leaf fairly closely into these named groups. For example, in, say, a third picking, there may still be dry natured leaf, which are lugs. There will be glossy, wide, elastic leaves, which are cutters. There may be heavier bodied leaf with less stretch. These are the leaf. The difference in texture divides them into their natural groups. Each group then has to be separated according to the variation in colour, size and freedom from damage.

Don't forget to destroy the tobacco stalks on *your* farm as soon as possible. This will help to control insect pests and diseases during next season. Also destroy the tobacco waste around barns, stringing shed and grading room.

—E. J. McDONALD,
Adviser in Tobacco Culture.

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Don't Let This Happen!

A man was operating a wheel-type tractor pulling out scrub with a ¾-in. wire rope about 30 ft. long. He accelerated the tractor suddenly, causing the resistance in the rope to overturn the tractor backwards. He was killed instantly.

The drawbar had been removed and the wire rope was attached to the axle while the machine worked down a slope.

This type of accident proves how simply death can follow wrong use of wheel type tractors. It would not have happened if the drawbar had been used.

Tuberculosis-Free Cattle Herds. (As at 1st May, 1959.)

Aberdeen Angus.

G. H. & H. J. Crothers, "Moorenbah," Dirranbandi
A. G. Elliott, "Ooraine," Dirranbandi
W. H. C. Mayne, "Gibraltar," Texas

A.I.S.

M. E. & E. Scott, "Wattlebrae" A.I.S. Stud, Kingaroy
F. B. Sullivan, "Fermanagh," Pittsworth
D. Sullivan, "Bantry" Stud, Rossvale, *via* Pittsworth
W. Henschell, "Yarranvale," Yarranlea
Con. O'Sullivan, "Navillus" Stud, Greenmount
H. V. Littleton, "Wongelea" Stud, Hillview, Crow's Nest
J. Phillips and Sons, "Sunny View," Benair, *via* Kingaroy
Sullivan Bros., "Valera" Stud, Pittsworth
Reuschle Bros., "Reubydale" Stud, Ravensbourne
A. C. and C. R. Marquardt, "Cedar Valley," Wondai
A. H. Sokoll, "Sunny Crest" Stud, Wondai
W. and A. G. Scott, "Welena" A.I.S. Stud, Blackbutt
G. Sperling, "Kooravale" Stud, Kooralgin, *via* Cooyar
C. J. Schloss, "Shady Glen," Rocky Creek, Yarraman
W. H. Thompson, "Alfa Vale," Nanango
S. R. Moore, Sunnyside, West Wooroolin
H. M. State Farm, Numinbah
L. R. Dennis, Diamondvale, Mundubbera
Edwards Bros., "Spring Valley" A.I.S. Stud, Kingaroy
D. G. Neale, "Grovely," Greenmount
A. W. Wieland, "Milhaven" A.I.S. Stud, Milford, *via* Boonah
W. D. Davis, "Wamba" Stud, Chinchilla
Queensland Agricultural High School and College, Lawes
C. K. Roche, Freestone, Warwick
Mrs. K. Henry, Greenmount
D. B. Green, "Deloraine" Stud, Durong, Proston
E. Evans, Wootha, Maleny
T. L. and L. M. J. Cox, "Seafield Farm," Wallumbilla
J. Crookey, "Arolla" A.I.S. Stud, Fairview, Allora
M. F. Power, "Barfield," Kapaldo
A. H. Webster, "Millievale," Derrymore
W. H. Sanderson, "Sunlit Farm," Mulgildie
R. A. and N. K. Shelton, "Vuegon" A.I.S. Stud, Hivesville, *via* Murgon
R. R. Radel & Sons, "Happy Valley," Coalstoun Lakes
C. A. Heading, "Wilga Plains," Maleny
G. S. and E. Mears, "Morden," M.S. 755, Toogoolawah

Ayrshire.

L. Holmes, "Benbecula," Yarranlea
J. N. Scott, "Auchen Eden," Camp Mountain
E. Mathie and Son, "Ainslie" Ayrshire Stud, Maleny
B. Goddard, Mt. Tyson, *via* Oakey
C. E. R. Dudgeon, "Marionville" Ayrshire Stud, Landsborough
G. F. H. Zerner, "Pineville," Pie Creek, Box 5, P.O., Gympie
T. F. Dunn, Alanbank, Gleneagle

Friesian.

C. H. Naumann, "Yarrabine" Stud, Yarraman
D. J. Pender, "Camelot," Lytton road, Lindum
S. E. G. Macdonald, "Freshfields," Marburg

Guernsey.

C. D. Holmes, "Springview," Yarraman
A. B. Fletcher, Cossart Vale, Boonah
W. H. Doss, Degilbo, *via* Biggenden
A. C. Swendson, Coolabunia, Box 26, Kingaroy
C. Scott, "Coralgrae," Din Din Road, Nanango
R. J. Wissemann, "Robnea," Headington Hill, Clifton
G. L. Johnson, "Old Cannindah," Monto
A. Ruge & Sons, Wowoonga, via Biggenden
G. Miller, Armagh Guernsey Stud, Armagh, M.S. 428, Grantham
N. H. Sanderson, "Glen Valley," Monto

Jersey.

Queensland Agricultural High School and College, Lawes
J. S. McCarthy, "Glen Erin" Jersey Stud, Greenmount
J. F. Lau, "Rosallen" Jersey Stud, Goombungee
G. Harley, Hopewell, M.S. 189, Kingaroy
Toowoomba Mental Hospital, Willowburn
Farm Home for Boys, Westbrook
P. J. L. Bygrave, "The Craigan Farm," Aspley
R. J. Crawford, "Inverlaw" Jersey Stud, Inverlaw, Kingaroy
P. H. F. Gregory, "Carlton," Rosevale, *via* Rosewood
E. A. Matthews, "Yarradale," Yarraman
A. L. Semgreen, "Tecoma," Coolabunia
L. E. Meier, "Ardath" Stud, Boonah
A. M. and L. J. Noone, "Winbirra" Stud, Mt. Esk Pocket, Esk
W. S. Conochie and Sons, "Brookland" Stud, Sherwood road, Sherwood
Estate of J. A. Scott, "Kiaora," Manumbar road, Nanango
F. W. Verrall, "Coleburn," Walloon
C. Beckingham, Trouts road, Everton Park
G. H. Ralph, "Ryecombe," Ravensbourne
Mrs. I. L. M. Borchert, "Willowbank" Jersey Stud, Kingaroy
Weldon Bros., "Gleneden" Jersey Stud, Upper Yarraman
D. R. Hutton, "Bellgarth," Cunningham, *via* Warwick
J. W. Carpenter, Flagstone Creek, Helidon
H. G. Johnston, "Windsor" Jersey Stud, Beaudesert
S. A. Cramb, Bridge street, Wilsonton, *via* Toowoomba
J. A. & E. E. Smith, "Heatherlea" Jersey Stud, Chinchilla
W. C. M. Birt, "Pine Hill" Jersey Stud, Gundiah
T. Nock, Dallarnil
P. Fowler & Sons, "Northlea," Coalstoun Lakes
F. Porter, Conondale
H.M. State Farm, Palen Creek
B. T. Seymour, "Upwell" Jersey Stud, Mulgildie
R. N. Burrows, Box 23, Wondai
W. T. Tatnell, Cedar Pocket, *via* Gympie

Poll Hereford.

W. Maller, "Boreview," Pickanjinnie
J. H. Anderson, "Inverary," Yandilla
D. R. and M. E. Hutton, "Bellgarth," Cunningham, *via* Warwick
E. W. G. McCamley, Eulogie Park, Dululu
Wilson and McDouall, Calliope Station, Calliope

Poll Shorthorn.

W. Leonard & Sons, Welltown, Goondiwindi

Dairymen Might Profit From These Winter Pastures

By C. A. SCHRODER,
Assistant Irrigationist.

South Queensland dairymen with autumn-winter-spring feeding problems might well profit from reading this article on irrigated, annual-type, winter pastures.

The problem of maintaining dairy cows in satisfactory condition and at a good level of production for a lengthy lactation period is a major one for all dairy farmers in the State.

In very many instances, production drops seriously in the autumn-winter-spring period.

Very commonly too, many animals lose condition in this period. They either go dry or drop so low in milk production that they are unable to get back to a profitable level when favourable conditions recur.

When the economics are investigated, there are too many cases found where the dairy programme is being carried on at either very low profit or no profit at all during the period.

Problem in Lockyer Valley

Rainfall in the Lockyer Valley, in common with the remainder of the State, is predominantly of summer incidence.

Records for 57 years to December, 1956, show the average annual rainfall to have been 29.38 in. Of this amount, 20.05 in. fell in the six months, October to March.

Under such conditions of climate, it naturally follows that the pastures are dominated by summer-growing species such as paspalum, Rhodes and green panic grasses, and the native blue grasses.

These pasture types make rapid growth following the annual onset of the summer rains. They quickly produce large quantities of succulent, attractive, highly nutritious pasturage capable of giving high production in the dairy herd.

Excellent as these pastures are, they retain their succulence and high food value for a short period only. There is a rapid decline in growth rate, palatability and nutritive value following the summer flush, and this decline in the pastures results in a serious fall in the production of the herd.

The Missing Link

Pasture research workers, and dairymen too, know only too well that we in Queensland have not got a pasture plant that will grow solely under natural conditions and provide a reliable source of quality feed in this period of scarcity.

Any such plant would need to be able to survive the competition of the vigorous summer-growing species and still be capable of growth in winter in a soil much depleted of moisture and plant nutrients and under light, erratic and unreliable rainfall. We have not yet got such a plant.

Only too conscious of the problem and the need for an answer, the dairymen and scientists of this State have attacked the task, and some new practices have been added. Very briefly, these include:

(1) Improved methods of pasture management, including fertilizer treatment.

(2) Cultivation of crops, such as oats, for supplementary grazing.

(3) Conservation of silage and hay.

(4) Purchase of concentrates.

(5) Maintenance of an area of permanent irrigated pasture to act as a protein supplement.

(6) Management of the herd so that maximum feed requirements coincide with maximum pasture growth; for example, seasonal calving practices.

Filling the Gap—New Methods

In recent years, marked success has been achieved at the Gatton Regional Experiment Station by replacing the oat grazing programme with irrigated, annual-type, winter pasture. This method, which has been in use since 1952, has given good results every season. It is described in detail in this article.

Trials using other methods have been in progress since 1957. Early results are promising. Some brief notes regarding these are included later for those who may wish to try the practices for themselves.

What are irrigated, annual-type, winter pastures? As the name implies, this type of pasture comprises winter-growing, annual pasture species grown under irrigation.

Being annual in habit, the components of the pasture grow from seed, complete their growth cycle, ripen their seed and die off within the one season.

Species that have been used include early strains of subterranean clover, such as Yarloop and Clare, with Wimmera ryegrass. In some instances, small seedings of lucerne—up to 8 oz. an acre—have been included to provide some summer grazing from natural rainfall.

Annual and perennial prairie grasses both have possibilities for use in such pastures.

Who can grow irrigated pastures? Successful production of this type of pasture can be achieved by anyone

Plate 1.

High Winter Production is Obtained from Cows at the Gatton Regional Experiment Station.

who has a supply of irrigation water and suitable land.

Irrigation is essential.—It is emphasised at the outset that irrigation is essential in almost all seasons.

Any attempted growth of such pastures is definitely not recommended if this condition cannot be met.

It will be noted later that irrigation requirements are low. This is a big factor in keeping production costs down.

Permanence of the Pastures.—Although the components of such pastures are of annual habit, they have the ability to regrow in successive years from the seed produced in the previous years.

Re-establishment occurs naturally each year in the existing stubble. Plowing or other cultivation is required only under exceptional circumstances. These rarely occur more often than once in three years.

This annual re-establishment by natural methods takes place when suitable conditions of temperature and moisture occur. February is the month for this.

Thus, such pastures, in this sense of annual self-re-establishment, can be regarded as permanent annual winter pastures.

When do they grow? Initial sowing is usually carried out into well-prepared land during the first week in April.

When this is done, grazing is usually available approximately seven weeks after planting, that is, about the third week in May in the year of original planting.

In subsequent years, germination, occurring naturally from the seed produced in the preceding year, usually takes place in late February or early March. In some years it is even earlier.

Early germination and persistence of seedlings in an area set aside to pasture is helped by the existing stubble, which reduces soil temperatures and delays the drying out of the soil surface after rain.

The first grazing of the self-regenerated pasture stand is generally ready very early in May.

How long is the season? High quality pasturage is normally available until mid-October.

After this date, seeding down and death of the components occur.

The dried-off stubble is incapable of giving good milk yields. It is, however, quite a good source of roughage, and fed alone is quite a satisfactory feed for dry stock.

Growth rates of annual species.—Cool weather growth rates of the annual winter species are considerably in excess of those of the perennial species.

Growth rate comparisons were made on the Gatton Station from June to August inclusive, as this represents the period when pasture production is of great significance.

During this period, the average growth rate of a third year irrigated annual winter pasture was 1·15 tons green weight per acre per week. For this same period the average growth rate of a permanent irrigated mixed pasture of the same age was only 0·646 tons per acre per week.

Annual Production

The total pasture yields each season have been very encouraging.

These have been regularly 2½ times greater than that of oats grown on the Station in the same seasons on a well-prepared fallow without irrigation. However, where the area of irrigible land is small or water supplies limited, oats or other grazing crops should be grown under natural rainfall conditions to supplement the irrigated pastures.

Some actual yield details are given to indicate high yielding potential:

(1) A new irrigated annual pasture comprising Gatton strain Wimmera ryegrass and Yarloop and Clare

strains of subterranean clover was planted on April 2, 1957.

The pasture was subsequently grazed five times during the season.

Pasture yield determinations were made before the introduction of stock at each grazing period. Pasture yields were as follows:—

—	Pasture Green Yield Tons/acre.	Average Weekly Growth Rate Green Tons/acre.
First grazing 20–5–57	4·77	·70
Second grazing 11–6–57	4·88	2·14
Third grazing 17–7–57	5·68	1·17
Fourth grazing 9–9–57	9·31	1·23
Fifth grazing 22–10–57	6·89	1·12
Total Green Yield	31·53 Tons/acre.	

Average weekly green growth rate from planting date to 22–10–57 was 1·09 tons/acre.

(2) A Wimmera rye-Yarloop subterranean clover irrigated pasture was planted on April 28, 1952.

This was the original of this type of pasture planted on the Station as a grazing trial.

The first grazing was ready on June 30, 1952, giving a quick return under the winter conditions. Actual production in the first year was quite comparable with that already detailed.

The pasture was grazed each year until seeding occurred.

Irrigation was then withheld, and the pasture allowed to set seed for the following year's regrowth.

The only cultural treatment applied was a low mowing in February each year to reduce growth of volunteer summer weeds.

Excellent stands of pasture were obtained by natural re-establishment each year.

Towards the end of the fourth season, the pasture was ploughed out to provide an area of improved soil for other experimental work. It was still highly productive.

Yield determinations for the season 1954 are tabulated.

These figures are for the third year of the pasture. They show that high production is not confined to the year of planting but continues in the succeeding seasons.

On account of climatic conditions, the first grazing was not available until June 3, 1954, an unusually late date.

Grazing Date.	Pasture Green Yield. Tons/acre.	Weekly Growth Rate Green Tons/acre.
3– 6–54 . .	6·3	First grazing
23– 7–54 . .	7·47	1·07
31– 8–54 . .	5·62	1·24
26–10–54 . .	5·53	0·79

Total production for season 24·92 green tons.

Average weekly green growth rate from June 3, 1954 to August 31, 1954 was 1·15 tons per acre.

Results were of a similar order every year.

Yields From Other Crops

Oat varietal grazing trials are carried out on the Station each year.

No irrigation was applied.

SEASON 1957

Total green yields in tons/acre.

Variety.	
Belah	10.28
Benton	11.42
Bovah	10.90
Clinton	11.65
Bonda	11.12
Mindo	11.96
Vicland	10.44
Average	11.11

The following yields were obtained in the seasons quoted:

SEASON 1954.

Variety.	Green Yields when Grazed (Tons/acre).			Total Yield of Three Grazings.
	1st Grazing 22–6–54.	2nd Grazing 24–8–54.	3rd Grazing 28–9–54.	
Garry	3·61	2·11	0·53	6·25
Klein	3·05	1·45	1·63	6·13
Vicland	3·59	1·86	0·41	5·86
Belah	3·93	2·34	0·57	6·84
Algerian	3·47	1·26	0·60	5·33
Bovah	2·88	1·36	0·46	4·70
Means	3·42	1·73	0·70	5·85

(With rainfall below normal, this crop was given one irrigation of 3 in. following planting.)

The yield from these crops was much less than that obtained from the irrigated pastures.

Production from Grazing Angle

Grazing schedules were kept each year.

The capacity of the pastures to provide a heavy amount of grazing is revealed by these records.

The pasture of which yield details were given in 1957 provided the very heavy amount of 441 full days of cow grazing per acre for the season. Dairy cows in milk were used in this trial.

The pasture of which the yields are given for 1954 provided 377 full days of cow grazing per acre. Forward steers and dry cows were grazed in this trial.

What Does This Mean in Practice?

The actual grazing results obtained on the Gatton Station show that one acre of such pasture properly managed can be expected to provide full grazing for 2½ cows in full milk per acre from the time that the first grazing is available—about the third week in May—until just after the middle of October.

However, the method of grazing that would be most suitable to most dairymen would be to use the pastures in conjunction with whatever other feed was available. In this case the pasture would be grazed twice a day for a period up to one hour per grazing. In this way the pasture would be regarded as a high quality protein supplement to the ration. Of course, it would have a much wider benefit than just as a source of protein—the mineral content and the succulence are of much benefit to stock, particularly as they are supplied in a period when most feed is dry and of poor quality.

Under such circumstances cows eat greedily. A cow will probably obtain at least ⅓ of her total daily food intake from the irrigated pasture.

Grazed for two hours a day, one acre of pasture will provide grazing for six to seven such cows over the period mentioned.

The food thus obtained will normally improve the quality of the ration to such an extent that the addition of concentrates is not required.

Method of Grazing

Best results are obtained by using an easily movable electric fence.

Grazing should be done in narrow strips to prevent wastage by trampling and fouling.

Most efficient usage with the electric fence is obtained in these densely growing pastures if the cows are made to graze "under-the-fence." This means just moving the fence to the edge of the ungrazed area; the cows will then reach under the fence to graze. For this method it will be necessary either to employ a long strip if practicable or else to shift during the grazing. When making such a shift, the end points of the fence can be left unmoved and it is a matter of just lifting out the posts used (these are very serviceable if made out of ⅜ in. round mild steel) and moving them back 2 or 3 ft. It is not necessary even to switch off the current to do this.

However, care must be taken not to allow stock to remain long enough on any strip to allow it to be too heavily grazed.

As with all pasture grazing, care must always be exercised to prevent over-defoliation of the pasture at any time of grazing.

Over-defoliation (grazing down too hard) will very quickly reduce the vigour and growth rate of the pasture and if continued will very soon render the stand unprofitable.

The harmful effects of hard grazing cannot be over emphasized.

Pasture harrowing should be carried out after each time of grazing. This operation should achieve effective smearing of manure. No cultural effect should be aimed at. If the amount of ungrazed residue is extensive it should be trimmed back with the mower.

The Economic Result

With a good average herd, well cared for and grazing the pasture full time, each ton of the pasture under consideration will provide 14 lb. of commercial butter.

A return of 390 lb. of commercial butter an acre of pasture should be obtained per season with such a herd.

With a factory return of 3s. 6d. a lb. for butter this represents a gross income of £68 an acre a season from the pasture.

Rather more than this would be obtained if the dairy supplies warm milk instead of butter.

Pasture Production Costs

Irrigation.—Pastures grown on the Gatton Station are surface irrigated.

Plate 2.

Abundance of Winter Feed is Produced by Irrigated Pastures. Photographed on July 24, 1956.

Plate 3.

Strip Grazing Under the Fence Results in Proper Pasture Utilisation.

Usually about 12 in. of irrigation water are necessary in addition to rainfall in a normal season.

The cost of applying this, including costs for capital outlay on plant, preparation of land for surface irrigation, power and labour amounts to less than £4 10s. an acre.

If irrigation is applied by spray irrigation methods the cost would rise to approximately £11 an acre.

Seed Cost.—The cost of seed an acre (July 1957 prices) for original planting of the pasture would be:—

	£	s.	d.
Wimmera ryegrass— 4 lb. at 1s 6d. ..		6	0
Yarloop strain sub-clover— 4 lb. at 3s. 9d. ..		15	0
Clare strain sub-clover— 4 lb. at 9s. 3d. ..	1	17	0
Lucerne— 8 oz. at 5s. 7d. ..		2	10
Total ..	£3	0	10

Seed purchase is necessary in the first year only, as the pasture provides its own seed for subsequent years.

Cultural Operations.—As with seed costs, the cost of preparing the land occurs for the year of original planting only.

Some other cultural operations may become necessary in succeeding years.

Mowing to remove volunteer growth of summer grasses and weeds is necessary to enable germination of the fallen seed. One mowing about the end of February is usually all that is necessary. However, the pasture area can often be grazed short at this period. This would dispense with the need for mowing.

If the presence of this summer growth becomes heavy enough to interfere with the natural re-establishment of the pasture, some tine cultivation with a chisel plough or tine cultivator is beneficial. This should not usually be necessary more frequently than every second or third year.

(TO BE CONTINUED.)

Pointers to the Greater Use of Buttermilk

By W. D. MITCHELL,
Dairy Technologist.

The current price of £70 a ton suggests more buttermilk powder could be made to meet the steady demand from the animal and the food-processing industries.

THE present economic difficulties confronting the dairying industry in Queensland demand a detailed examination of all phases of dairy production whether on the farm, in the factory or associated with marketing operations. Returns to producers have varied widely because it has become necessary to dispose of significant quantities of surplus produce, particularly butter, on an unstable export market.

In these circumstances, one phase of dairy production which warrants consideration is the utilization of what are normally termed by-products, that is skim milk, whey, and buttermilk. Buttermilk is of major importance in Queensland where each season some 10 to 13 million gallons are available for disposal.

There are many questions to be asked in relation to this large quantity of surplus produce.

What are the main avenues of disposal?

Are existing avenues being adequately supplied?

Are new avenues of disposal available, and if so will it prove profitable to supply these markets?

These questions must be answered before an assessment of the true value of buttermilk to the industry can be obtained.

Plenty of It

The quantities of buttermilk available each season throughout the state are listed in Table 1 and these values indicate the seasonal fluctuations which can occur for example during the 1957-58 drought season.

This table shows that large quantities of buttermilk are available for either human or animal consumption each season, even during drought

TABLE 1.

Period.	Total Butter Production. (tons).	Total Choice Butter. (tons).	Total B/Milk (gallons).*	Total Choice B/Milk (gallons).*
1943–48	42,529	26,663	12,176,000	7,664,000
1948–53	43,924	28,176	12,575,000	8,067,000
1953–54	41,798	24,821	11,967,000	7,106,000
1954–55	45,915	27,113	13,145,000	7,762,000
1955–56	48,189	28,235	13,797,000	8,084,000
1956–57	41,089	24,437	11,764,000	6,996,000
1957–58†	32,280	19,078	9,242,000	5,462,000

* Quantity estimated on basis of 2,863 lb. of buttermilk being discharged from 1 ton of butter
† Drought period.

periods, and of this a significant amount is of good quality.

How It Is Used Now

Present supplies are used either in the natural liquid form by direct sale to established piggeries or else manufactured into buttermilk powder and sold mainly for animal and poultry foods. By far the major portion is disposed of in the liquid form, only an estimated 16 per cent. being used for powder production during the five year period 1953-58.

(*a*) *Liquid Disposal.*—The usual system of utilization of liquid buttermilk is for nearby piggeries to contract to remove all buttermilk and waste water from the vicinity of the factory. The liquids are either pumped direct to the piggery or else bulk stored in special vats outside the factory buildings proper for subsequent removal by truck. The disposal of waste water along with surplus buttermilk is a feature which must be considered where the conversion to manufacture of buttermilk powder is contemplated. Disposal of waste water in these circumstances becomes the responsibility of the factory and local conditions will largely determine if this can be undertaken without serious difficulties.

(*b*) *Powder Production.*—The only type of buttermilk powder produced in Queensland is the roller dried type. While only small quantities of powder are being manufactured in Queensland at present, some 80 tons a year were being processed as long ago as 1943-44. The development of buttermilk powder production in Queensland is shown in Table 2 which lists the number of factories and the quantities produced annually during the two 5-year periods 1943-48 and 1948-53 and the 5-yearly period since.

TABLE 2.

Period.	No. of Factories.	Total Quantity (tons/year).
1943–48 . .	2–3	154
1948–53 . .	3–4	233
1953–54 . .	6	481
1954–55 . .	7	712
1955–56 . .	7	811
1956–57 . .	7	672
1957–58 . .	7	563

How It Is Made

To produce buttermilk powder, buttermilk is collected directly from the churn at the completion of churning and pumped to special holding vats. From here it is pre-heated to temperatures approximating 180 deg. F. and then fed onto special rollers designed for the purpose of drying. Along the length of each drum a finely ground knife blade is fitted, which when lightly pressed onto the roller surface peels off the dried milk film. The powder falls into collection troughs and is transported to flues leading to the packing equipment.

The average composition of good quality buttermilk powder together with the composition of liquid buttermilk for comparison is listed in Table 3. A useful rule-of-thumb formula to estimate quantity of powder available is to allow 1 ton of powder for each 10 tons of butter manufactured.

TABLE 3.

Constituent.	Buttermilk Powder.	Buttermilk Liquid.
	Per cent.	Per cent.
Moisture . .	4·0	90·5
Fat	10·0	·8
Protein	35·0	3·5
Lactose . .	42·2	4·4
Acidity (per cent. Lactic Acid)	·8	·10
Ash	8·0	·8

What It Costs

Costs of production of roller-dried powder vary between individual factories. Estimated costs for 1957-58 obtained from factories at present engaged in powder production indicate that a return of £35-£45 per ton is required to meet what may be termed "manufacturing costs" that is wages, fuel and containers. These costs are listed in Table 4. They indicate a wide variation between factories for such costs. This could result from a difference in the tonnage manufactured and the geographical position of the particular factory.

TABLE 4.

Factory.	Item (£ per ton).			Total Manufacturing Costs.
	Wages.	Fuel.	Containers.	
	£	£	£	£
A	17½	17½	4	39
B	15½	22	5	42½
C	21	14	5	40
D	12	17½	5	34½
E	19	10	4	33
F	17	22	5½	44½

To commence the manufacture of roller-dried buttermilk powder a large expenditure must be incurred. Where suitable premises and boiler capacity are available this capital expenditure would be markedly reduced.

TABLE 5.

Estimated Capital Expenditure to Commence Buttermilk Powder Production from 1,200–1,400 Tons of Butter.

Equipment.	Expenditure. (£)*.
Holding Vats (2)	3,000
Pumps	18,000
Preheater	
Rollers, Hoods (3) ..	
Power Conveyors, etc. ..	
Packaging Equipment ..	
Piping, fittings, etc. ..	
Boiler Power (5,500 lb. steam/hr.)	8,500
Building (42 ft. x 40 ft.) ..	4,500

* Estimates supplied by James Bell Machinery Co.

Its Uses For Stock

The main uses of existing supplies of buttermilk powder are in animal and poultry feeding. Its high protein content, together with calcium and B-group vitamins, riboflavin or B_2 in particular, make it a valuable food for young stock and lactating animals.

A second advantage with powder is its storage properties. This minimizes the risk of disorders among young animals which can occur from contamination when liquids are stored.

The main sources of utilization are—

(i.) *Calf feeding.*—Buttermilk powder can be used to replace the whole milk in a ration after a few days, and the usual method of feeding is to reconstitute powder to liquid milk consistency at the rate of 1¼ lb. powder to 9 lb. water. It is particularly valuable for calf rearing in periods of low milk production or on market milk supply farms.

(ii.) *Pig feeding.*—Use of powder in the pig industry is determined by the economics of feeding in view of competition from high protein meat meals. It is possible, however, to have as high as 40 per cent. buttermilk powder in feeding mixture for young pigs.

(iii.) *Poultry.*—Buttermilk powder is used extensively in the poultry industry because of its high riboflavin content and the high biological value of its protein. It is fed to breeding stock to improve the hatchability of eggs, and is claimed by poultry keepers to have a beneficial effect on the quality of the flesh of table poultry. It is particularly valuable in the ration of chickens to prevent the the paralytic disease arising from riboflavin deficiencies. The general feeding rate is 3–8 lb. of powder to 100 lb. of feeding mixture, this being fed from day old to 8 weeks.

It must be appreciated that demand for animal feeding, particularly calves, is of a seasonal nature being heavy during winter months. With adequate packaging it is possible to store powder manufactured in the flush summer months for sale in this winter period.

Some quantities are used by certain food processors but to date only in small amounts.

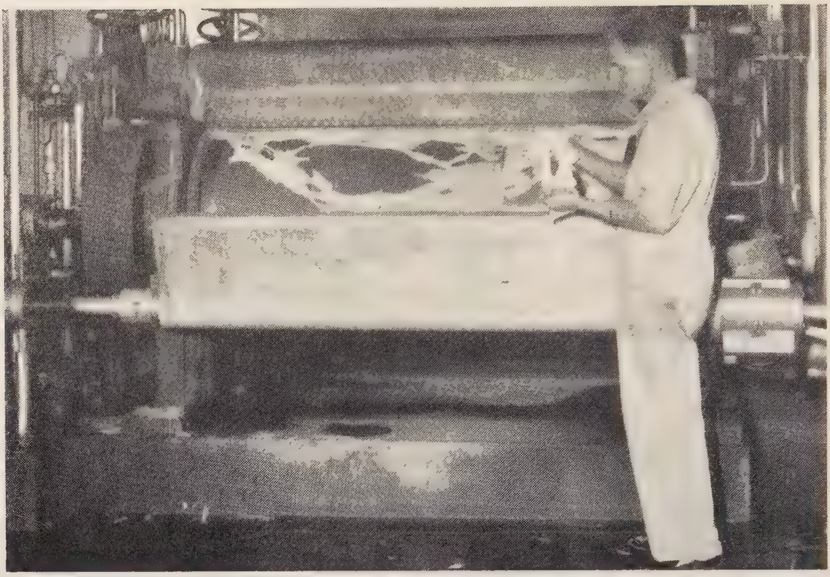


Plate 1.

Buttermilk Powder Film as it Leaves the Roller Surface and Falls into Collection Trough.

Can More Be Used ?

The continuous demand for buttermilk powder for animal feeding and a possible increase in human demand indicates that more attention could be given to the conversion of this valuable by-product into the powder form.

Table 6 lists the gross return per ton which has been obtained in powder in two factories in recent years.

TABLE 6.

Year.	Factory (£/ton).	
	1.	2.
1954–55	53·6	56·1
1955–56	53·2	75·6
1956–57	71·2	72·6
1957–58	71·3	74·7

A second avenue which promises to provide a means of utilization is the baking industry. Recent legislation to permit the manufacture and sale of milk bread provides conditions which warrant close examination by the industry. Baking experiments conducted in Sydney have indicated that if shortening is added to buttermilk powder a satisfactory milk loaf can be manufactured. It should be possible to include this shortening and/or emulsifying agents in the milk prior to actual drying operations. Should the production of such powder become a reality it is recommended that only quality buttermilk be used for drying to ensure that no undesirable off-flavours are transmitted to the subsequent bread.

The current price of £70 a ton suggests that more powder could be manufactured to meet the steady demand from the animal and the food-processing industries. These conditions suggest that several of the larger factories with their large surplus of buttermilk could profitably manufacture supplies of such powder if their present contract price for the sale of liquid milk for pig feeding is not high.

Acknowledgements.—The co-operation and supply of the relevant information from James Bell Machinery Co. and the several dairy associations at present manufacturing roller dried buttermilk powder is gratefully acknowledged.

Herringbone Shed Used By Gympie Farmers

By R. R. FANNING, Dairy Officer.

Two Gympie dairy farmers have found that an elevated herringbone milking shed they have just built removes much of the drudgery from milking. It is neat, solid and convenient, and there seems little doubt that, in the years to come, herringbone sheds will be widely used by farmers with big herds.

The elevated herringbone milking shed was described in the March *Journal* by J. D. Elrington, Senior Dairy Machinery Adviser.

The farmers are Messrs. W. and H. Mahaffey, of Goomboorian, near Gympie. The type of shed they have built is new to Queensland. The idea came from Massey College in New Zealand, but this shed was built for Queensland conditions. Not only is it soundly constructed, but it contains all the conveniences of a modern dairy.

This dairy has many good features. A large roof with an overhang of 2 ft. 6 in. provides extra protection from sun and rain. Excellent ventilation is provided by glass louvres, which also allow regulated ventilation and give maximum light for the interior. The internal lining of the roof means cool conditions during the summer.

Tempered hardboard has been used to line and ceil the entire building resulting in a well-finished interior. This has meant that crevices and joints which are traps for dust and manure have been eliminated. Fluorescent lighting adds to the modern appearance and provides adequate light.

These features are illustrated in Plate 1. This illustration also shows the milker's alley, the herringbone

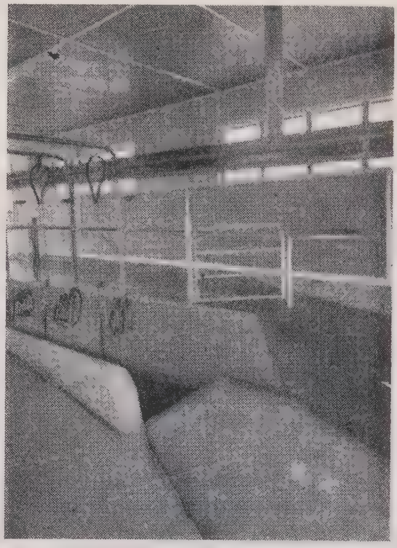


Plate 1.

Inside the New Herringbone Milking Shed. The picture shows the milker's alley, the herringbone arrangement of the bails, and the gate through which the cows leave the ramp. Tempered hardboard lining and fluorescent lighting add to the modern appearance.

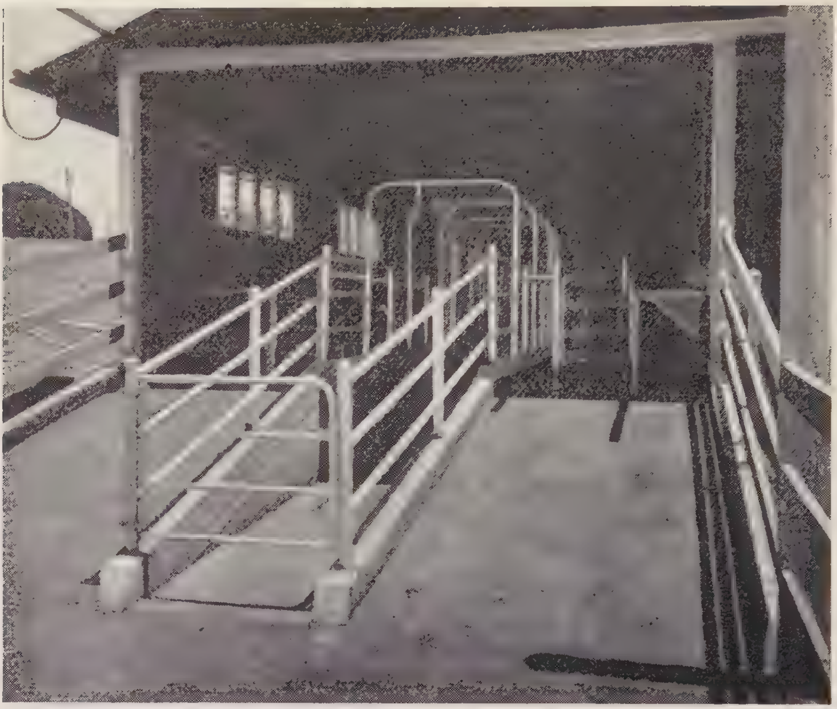


Plate 2.

The entrance to the milking shed. The combination of concrete, steel and timber is strong, durable and neat.

arrangement of the bails and the gate through which the cows leave the ramp. It will be noted that the floor of the shed is constructed on three levels at the exit or milk room end of the building. In this way, the grade of the exit race is greatly reduced and minimises slipping.

Tubular Steel

Galvanised wrought iron pipe has been used extensively in the bails and is rigidly erected in concrete. Plate 2 shows the tubular rails on the sides of ramps, the gateway at the top, which prevents cows backing out, and the gate between the small holding yard and milker's alley. The combination of concrete, steel and timber is strong, durable, neat and clean, and also provides an attractive appearance.

Plate 3 shows that the building is in a good position for drainage and sunshine.

Plate 3.

The building has been put up on a sunny, well-drained site.

The roof of the milking shed (Plate 4) extends over the two holding yards which have concrete floors. In order to obtain maximum sunlight and ample protection from rain, the roof was built so that the fascia boards would be 13 ft. above floor level. The size of the two holding yards are 32 ft. by 30 ft. and 18 ft. by 16 ft.

After the cows have been milked, they leave the shed by a side door and emerge, either into a concreted laneway leading to the pastures, or into a small holding yard.

Modern Equipment

A modern six-unit milking machine has been installed.

All the separator room fittings are metal. The milk vat stand, double-decker draining rack and milk vat rack are very neatly made from galvanised wrought iron piping. Individual electric motors on mountings above the floor drive the stainless steel separator, skim milk pump and machines.

A separate room has been built to house a steam sterilizer and to keep a quantity of wood dry during wet weather. This sterilizer provides adequate steam both for heating water used to clean the equipment and for steam-sterilizing the utensils after they have been washed. Two rooms have been provided at the front of the building, one for the installation of a refrigerator and the other for the storing of spare cans, veterinary supplies, and other items commonly used in the milking shed.

Plate 4.

The roof of the milking shed extends over two holding yards with concrete floors.

The solid construction of these premises, the neatness of work, the herringbone layout and the installation of good quality equipment add up to a dairy shed which removes much of the drudgery from milking.

* * *

Timely Hint For Winter Grazing

You can plant your winter grazing crops up till June. It is a good idea to stagger the plantings to allow continual grazing through the winter.

Oat varieties recommended are Benton and Saia, which are resistant to crown rust and best suited to coastal conditions. For inland areas plant Belah, Fulghum or Algerian.

If planting wheat, sow during May the varieties Lawrence, Celebration or Charter; for June planting, sow Gabo or Spica.

Legumes such as Dun field peas and Golden tares should be included in any plantings.

—*D. L. HASSELL, Senior Adviser in Agriculture.*

Brucellosis-Tested Swine Herds. (As at 1st May, 1959.)

Berkshire.

S. Cochrane, "Stanroy" Stud, Felton
J. L. Handley, "Meadow Vale" Stud, Lockyer
O'Brien and Hickey, "Kildurham" Stud, Jandowae East
G. C. Traves, "Wynwood" Stud, Oakey
Westbrook Farm Home for Boys, Westbrook
H.M. State Farm, "Palen" Stud, Palen Creek
A. R. Ludwig and Sons, "Beau View" Stud, Beaudesert
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
R. H. Crawley, "Rockthorpe" Stud, *via* Pittsworth
F. R. J. Cook, Middle Creek, Pomona
Mrs. I. M. James, "Kenmore" Stud, Cambooya
H. L. Stark, "Florida," Kalbar
H.M. State Farm, Numinbah
G. L. Gabanko and R. H. Atkins, "Diamond Valley" Stud, Mooloolah
L. Puschmann, "Tayfield" Stud, Taylor
C. E. Edwards, "Spring Valley" Stud, Kingaroy
V. F. Weier, "La Crescent," Clifton
N. Rosenberger, "Nevrose," Wyreema
L. P. Orange, "Hillview," Flagstone Creek
W. Young, Kybong, via Gympie
E. J. Clarke, Mt. Alford, *via* Boonah
G. McLennan, "Murcott" Stud, Willowvale
C. F. W. and B. A. Shellback, "Redvilla" Stud, Kingaroy
J. C. Lees, "Bridge View" Stud, Yandina
F. Thomas, "Rosevale" Stud, M.S. 373, Beaudesert
A. C. Fletcher, "Myola" Stud, Jimbour
Q.A.H.S. and College, Lawes
E. F. Smythe, "Grandmere" Stud, Manyung, Murgon
E. R. Kimber, Block 11, Mundubbera
A. J. Potter, "Woodlands," Inglewood
Regional Experiment Station, Hermitage
J. W. Bukowski, "Secreto" Stud, Oxley
R. Astbury, "Rangvilla," Pechey
L. Pick, Mulgildie
D. G. Grayson, Killarney
A. French, "Wilson Park," Pittsworth
P. F. Pfrunder, Pozieres

Large White.

H. J. Franke and Sons, "Delvue" Stud, Cawdor
Garrawin Stud Farm Pty. Ltd., 657 Sandgate road, Clayfield
J. A. Heading, "Highfields," Murgon
R. Postle, "Yarralla" Stud, Pittsworth
E. J. Bell, "Dorne" Stud, Chinchilla
L. C. Lobegeiger, "Bremer Valley" Stud Moorang, *via* Rosewood.
H. R. Gibson, "Thistleton" Stud, Maleny
H.M. State Farm, Numinbah
S. T. Fowler, "Kenstan" Stud, Pittsworth
W. Zahnow, Rosevale, *via* Rosewood
Regional Experiment Station, Biloela
G. J. Hutton, "Grajea" Stud, Cabarlah
H. L. Larsen, "Oakway," Kingaroy
A. Palmer, "Remlap," Greenmount
G. I. Skyring, "Bellwood" Stud, *via* Pomona
G. Pampling, Watch Box road, Goomeri
M. Hall, "Milena" Stud, D'Aguilar
K. B. Jones, "Cefn" Stud, Pilton road, Clifton
Barron Bros., "Chiltern Hill," Cooyar
K. F. Sturmer, French's Creek, Boonah
Q.A.H.S. and College, Lawes
R. S. Powell, "Kybong" Stud, Kybong, *via* Gympie
C. Wharton, "Central Burnett" Stud, Gayndah
S. Jensen, Rosevale, *via* Rosewood
V. V. Radel, Coalstoun Lakes
H. R. Stanton, Tansey, *via* Goomeri
L. Stewart, Mulgowie, *via* Laidley
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
O. J. Horton, "Manneum Brae" Stud, Manneum, Kingaroy
Dr. B. J. Butcher and A. J. Parnwell, 684 Logan road, Greenslopes, Brisbane
R. Kennard, Collar Stud, Warwick
A. C. H. Gibbons, Mt. Glorious
A. Kanowski, "Exton," Pechey
L. C. and E. Wieland, Lower Cressbrook
P. L. and M. T. D. Hansen, "Regal" Stud, Oaklands, Rangeville, Toowoomba
J. C. Lees, "Bridge View Stud, Yandina
C. Assenbruck, Mundubbera
A. J. Mack, Mundubbera
J. & S. Kahler, East Nanango
C. P. Duncan, "Hillview," Flagstone Creek

Tamworth.

D. F. L. Skerman, "Waverley" Stud, Kaimkillenbun
A. C. Fletcher, "Myola" Stud, Jimbour
Salvation Army Home for Boys, "Canaan" Stud, Riverview
Department of Agriculture and Stock, Regional Experiment Station, Kairi
T. A. Stephen, "Withcott," Helidon
W. F. Kajewski, "Glenroy" Stud, Glencoe
A. Herbst, "Hillbanside" Stud, Bahr Scrub, *via* Beenleigh
F. Thomas, "Rosevale" Stud, M.S. 373, Beaudesert
H. J. Armstrong, "Alhambra," Crownthorpe, Murgon
R. H. Coller, Tallegalla, *via* Rosewood
D. V. and P. V. Campbell, "Lawn Hill," Lamington
S. Kanowski, "Miecho" Stud, Pinelands
N. R. Potter, "Actonvale" Stud, Wellcamp
L. C. and E. Wieland, Lower Cressbrook
J. D. Booth, Swan Ck., Warwick

Wessex Saddleback.

W. S. Douglas, "Greylight" Stud, Goombungee
C. R. Smith, "Belton Park" Stud, Nara
D. T. Law, "Rossvill" Stud, Trouts road Aspley
J. B. Dunlop, "Kurrawyn" Stud, Acacia road, Kuraby
M. Nielsen, "Cressbrook" Stud, Goomburra
G. J. Cooper, "Cedar Glen" Stud, Yarraman
"Wattledale" Stud, 492 Beenleigh road, Sunnybank
Kruger and Sons, "Greyhurst," Goombungee
A. Scott, "Wanstead" Stud, Grantham
G. C. Burnett, "Rathburnie," Linville
A. J. Mack, Mundubbera
J. Ashwell, "Greenhill," Felton South

Large Black.

E. Pointon, Goomburra

Bucket and Bail

CROPS of grazing oats are the dairy farmers' standby during Queensland's normally dry winters and springs. Yielding up to five or six grazings, oats will cushion a herd's production against the sharp decline in pasture quality from early autumn onwards.

Farmers know that the planting season extends from late February to mid-June. Sown on well-prepared land in which adequate moisture has been conserved, oats will give about 400 cow-grazing-hours to the acre.

Every year, Queensland farmers plant about 300,000 acres of grazing oats, making this the top grazing crop in the State. Heaviest plantings are on the Darling Downs and in the Maranoa, but worthwhile acreages are also grown in the Moreton, Gympie, Maryborough, Rockhampton, Callide, Mackay, and Atherton districts.

Selection of the variety to be grown has an important bearing on the success of the planting.

In coastal districts during years of higher-than-average rainfall, crown rust can ruin oat crops. While there are no varieties completely resistant to crown rust at present available for planting in coastal districts, Bovah and Benton possess a fairly high degree of resistance. These can be relied upon to produce worthwhile grazing. Both of these varieties have also performed well on the Darling Downs, and in the Lockyer, Burnett, Callide, and Atherton districts.

In the drier, inland districts, Fulghum and Belar have been widely used for plantings from April to June. Algerian is a late-maturing variety which may be sown from February to April, and will often provide grazing through a dry spring. Vicland is also a popular variety for inland districts. It is mid-early and may be sown at any time during the autumn.

Grazing oats are usually sown at 40 to 60 lb. to the acre. For continuous grazing, plant an area equal in acres to one-third or one-half the number of cows being grazed. That is, for a herd of 36 cows, plant 12 to 18 acres of oats.

—*Dr. L. G. MILES,*
Director of Agriculture.

SHOCK cooling cream before placing it in a refrigerator will preserve its flavour and keeping quality. This operation cannot be neglected, or the even consistency and sound flavour usually found in refrigerated cream will be largely lost.

Some dairymen with cream refrigerators have stopped using the shock cooler supplied with the unit. Attention was first drawn to this when cream deliveries at factories failed to measure up to the standard expected of the refrigerated product. A check back was made, and in every instance it was found that the shock cooler had not been used for some time.

Because bulk cream cools only slowly in air, the use of shock cooling is a most important phase of this type of refrigeration. If it is discontinued, there is no aeration of the cream, and no rapid removal of animal heat. This means the existing cream in the can is being heated unnecessarily by the fresh quantity being separated. When cream in this state is placed in the enclosed cabinet of a refrigerator, off flavours develop.

Acid development takes place when a large quantity of warm cream is placed in a refrigerator. The prevention of acid development is one of the aims of refrigeration.

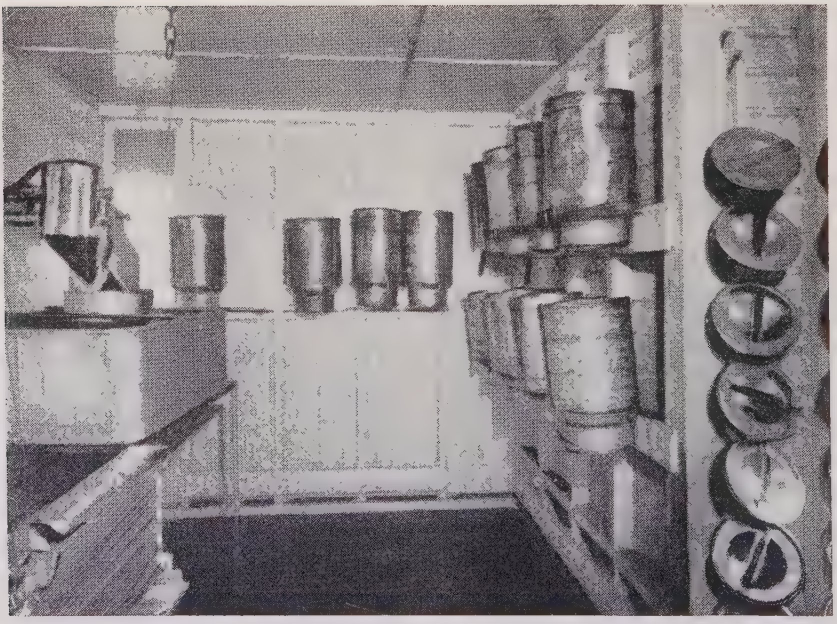
To outlay capital for a refrigerator and then fail to make the most effective use of it is clearly unwise. You can't expect to get your money's worth out of your refrigerator unless you use the shock cooler and use it efficiently.

—*T. W. SMITH,*
Dairy Adviser.

Plans For June

Prepare suitable calf paddocks for rearing young stock.
Commence training heifers to ensure good milk "let-down".
Tattoo calves for future identification.
Re-tin and repair cans during the winter months.
Ensure that cows have 4-8 weeks' dry period before calving.
Concrete holding yards and races to overcome dust and mud problems.
Dehorn cattle.

* * *



Clean, Dry Cans and Lids are an Important Factor in Quality Milk Production, as Demonstrated by Mr. A. Stepheson, of Jaggan, via Malanda, N.Q.

Cans have been stored upside down to ensure adequate drainage and prevent the entry of dust. A piece of 3 in. by 1½ in. timber with double width saw cuts makes an ideal lid rack. The saw cuts are about 9½ in. apart. During the slack period this winter, a few hours' effort could supply similar storage conditions on your farm.

Beef From Dairy Cows

By K. F. HOWARD,
Adviser in Cattle Husbandry.

RAISING of beef yearlings can be profitable either as an alternative to, or in conjunction with, dairying. Poor producers in dairy herds could often be more profitably used as breeders for beef when land is available.

When Messrs. N. D. and L. O. Bahnisch of Guluguba, north of Miles, switched over from dairying, they retained their cows for beef production. On their brigalow-box country they have been able to produce heifers and steers with an average dressed weight of 350 lb. at 12 months. These animals average £24 a head on the property when yearling beef is realising £7 10s. a 100 lb. at Cannon Hill.

At present ruling prices (3/3/59), their average net value on the property is about £28.

The time saved by allowing the calves to milk their mothers is used by the Bahnisch Brothers to improve their property and so increase its earning capacity.

How They Are Fed

At the Guluguba property, the A.I.S. mothers are run on brigalow and box country which grows natural grasses and Rhodes grass. Up to date, a Hereford bull has been used as a sire but a Zebu cross bull is now being tried.

The secret of success lies in having good feed for the calves when they are weaned. The Bahnisch Brothers rely mainly on non-irrigated lucerne,

Plate 1.

Yearlings at Time of Marketing. They made average daily gains of 1.7 lb. throughout life. Without the drought it is considered they could have dressed 400 lb. at 12 months of age.

Plate 2.

These Yearlings are Grazing Non-Irrigated Lucerne. Because of the drought they were not weaned in prime condition. However, lucerne, Rhodes grass and native grasses produced sufficient weight gains to ensure marketing as fat yearlings.

together with Rhodes and natural grass. They aim at marketing all of their yearlings between July and December when prices are generally higher than in the first six months of the year.

Altogether, 40 acres of lucerne and 35 acres of grass have been used to top off 60 yearlings a year. The calves were weaned in two lots, so that the 40 acres did not carry the 60 calves at the one time. They have found a winter crop an advantage—particularly for the feed produced from June to September. To market good quality steers and heifers at 12 months of age, feed must be provided throughout the life of the animal.

Marketing and Weight Gains

The calves are marketed at ages varying from 9 to 15 months, the average being 12 months. The age of selling differs according to the condition of the cattle and the prevailing price. If the yearlings are always kept in marketable condition, advantage can be taken of any rise in prices.

The Guluguba calves that dressed 350 lb. had to weather the 1957-58 drought. Their average gain each day throughout life was 1·7 lb.

With a good season and by using a winter crop, it is expected that this property will produce yearlings capable of dressing 400 lb. at 12 months. This includes heifers and steers.

Such cattle will average a gain of 2 lb. each day through life.

The Cost of Feed

On experience, 60 calves would have ample feed if allowed 40 acres of lucerne, 35 acres of grass and 30 acres of winter crop. This means that in addition to the normal cost of running a weaner on grass, there will be the cost of two-thirds of an acre of lucerne and half an acre of cultivation. A conservative cost for establishing an acre of lucerne or cultivation is £4.

Assuming the lucerne lasts for four years, this means that there is an additional cost for each yearling of 13s. 4d. for lucerne when it costs £1 per acre per year. The cost of half an acre of winter crop is £2.

The total additional cost per yearling is therefore £2 13s. 4d.

It is possible to provide this feed for a smaller cost if machinery is used efficiently.

A Difficulty

In flush periods when the calves are young, some cows will be burdened with an oversupply of milk. In such a period in 1959, only one out of 120 cows had to be brought in and milked out and she gave 4 gal. in the afternoon and 3 gal. the following morning. Such cows are soon recognised and could either be milked out or put on a restricted diet during the flush period.

The Bahnisch brothers, have gradually expanded their area of lucerne and crop and are now running 120 dairy cows for the purpose of turning milk into beef.

* * *

Beat the Fly

Do you Mules your weaner sheep as a simple routine job each year? If you don't, you are certainly missing out on one of the surest forms of protection against fly. Mulesing and mid-season crutching lay the foundation for immunity from fly waves long before they occur; jetting and spraying are mainly expedient measures used in an effort to stop the rot once the fly has built up its numbers. Mulesing once done lasts a lifetime; jetting only protects for a few weeks. Perhaps the best form of jetting at present is to use one of the Diazinon preparations at a concentration of 0.04 per cent. April and May are often peak periods for blowfly trouble, and from a few primary strikes untreated a vast flood of blowflies can spread to cause trouble to you and many flocks in your area. Reduce the number of these primary strikes that tend to crop up each spring and autumn, by having your flock Mulesed in readiness.

Station Identification

Floods sometimes cause isolation to man and animals, and western station owners might have to call on aircraft relief—the flying doctor—or the food plane. Can your homestead be identified from the air? The name of your property is best painted on the largest building; if it is gabled it should be on both sides. Air pilots say the best colours are black letters, 6 ft. high, on a yellow background. Smoke fires for showing position of an airstrip, or site for a drop, should give off black smoke, not white. Burning rubber or oil will give off black smoke.

—R. B. YOUNG, Senior Adviser, Sheep and Wool Branch.

Looking After Cattle Dips . . . And Taking Samples

By F. H. D. MARSHALL,
Technical Officer, and
C. W. R. McCRAY,
Senior Toxicologist.

IF you own a cattle dip you don't need to be told that modern dipping concentrates are more costly than the arsenical preparations with which we were so familiar prior to their advent. Probably you have also learned by this that the use of these newer tickicides presents problems concerning dip management and maintenance that were unknown in the old arsenic days.

The Department's advisory leaflet No. 147 deals with some of these problems, especially as they relate to DDT dips, but as new preparations continue to increase in number and complexity a few timely hints may help you to obtain the full 20 shillings worth of value for every £1 spent on your dipping programme.

Modern Tickicides

Unlike arsenical dipping fluids in which the tick-killing ingredient is in solution, like sugar dissolved in a cup of tea, the active material in modern tickicides, most of which are known as chlorinated hydrocarbons, is suspended in the dip in the form of minute crystals. For this reason, it is most important that you adhere strictly to the manufacturer's specifications when charging or "topping up" the dip.

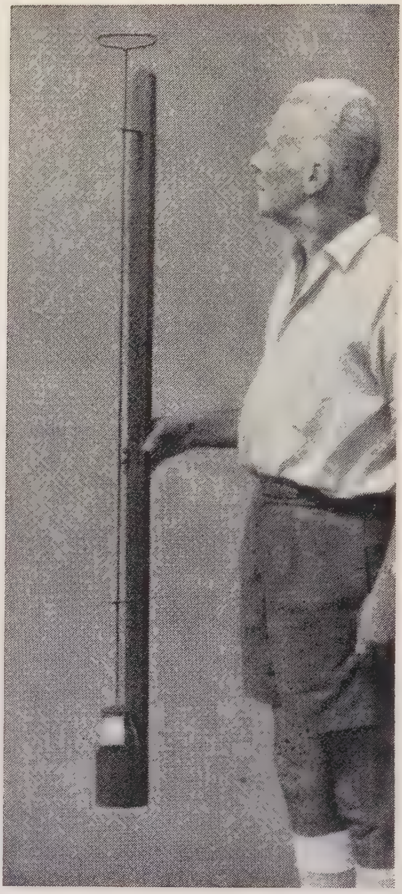


Plate 1.
Dip Sampler Developed by Department of Agriculture and Stock.

Many of the crystals attach themselves to particles of mud, hair or dung in the dip and so long as the quantity of these is not excessive this is a desirable state of affairs. However, like all good things, this can be overdone and excess of foreign matter in the dip can cause loss in both efficiency and hard cash.

Keep Dirt out of Dip

The water in an average size dip weighs about 11 tons, and the wave action in this fluid tends to pack silt at the junction of the floor and the

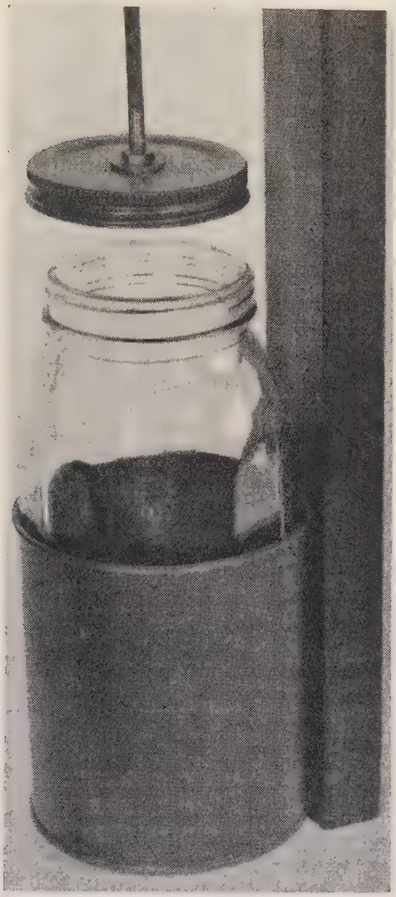


Plate 2.

Close-up of Lower End of Sampler Showing Jar in Position and Permanent Lid on Rod. Two lock nuts on the underside of the lid prevent it from working loose.

vertical wall at the plunge end of the dip. This silt, if allowed to remain undisturbed, can trap a great deal of active material, and eventually become almost as hard as rock. This may be minimized by filling this sharp corner and rounding it off with a mass of concrete as illustrated in Plate 6.

Fouling is mostly caused by the dung and dirt that is carried into the dip by the feet of the cattle.

To reduce fouling to a minimum:

1. As far as is practicable, avoid dipping after rain, while the ground is still damp and easily picked up.

2. Build a concrete foot-bath in the first panel or two of the crush, or better still, convert the whole forcing pen into a foot-bath as some dip-owners have done. You will be amazed to see how much dirt your cattle will leave behind, which would otherwise be carried straight into the dip. A wide-bore drain pipe built into the foot-bath will greatly facilitate its cleansing.

3. Use a stiff yard broom and a shovel to clear dirt and dung from the crush and draining pen before, during, and after dipping.

Stir Dip Thoroughly

The particles of silt and their passenger crystals of dip preparation must be brought back into the dipping

Plate 3.

Square-Nosed Shovel Used to Remove Silt from Plunge End of the Dip.

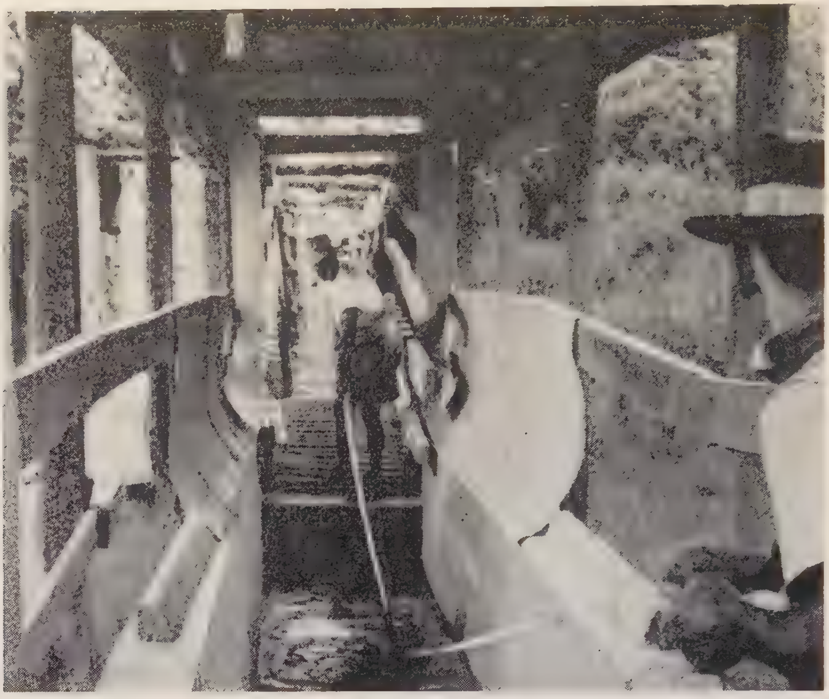


Plate 4.

The First Step in Stirring the Dip. Removing silt from the plunge end and dispersing it through the dip. Note rope used to haul the shovel along floor of dip.

fluid for effective dipping. Three steps are necessary to do this job properly:

1. Dislodge silt at plunge end with tool such as square-nosed shovel on long handle shown in Plate 3—(This process is fully described in the advisory leaflet mentioned).

2. Disperse the dislodged silt through the dip and then stir thoroughly with a hand-stirrer. An empty drum with a central hole in the lid and three or four holes cut around the side near the bottom, firmly fixed to a long piece of timber, as shown in Plate 5, makes a good stirrer. If sufficient labour is available to work two or three of these stirrers in the dip at the same time a great surging effect is created.

3. Dip about 20 to 40 cattle as additional stirrers (run these back to mob and dip again).

Failure to stir the dip thoroughly before use can result in the concentration of the active ingredient in the dipping fluid being too low to kill

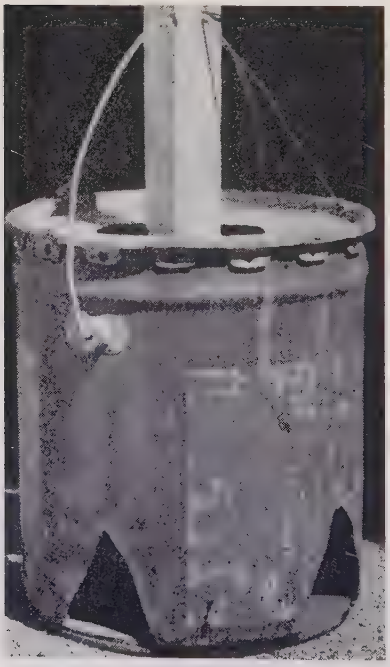


Plate 5.

Dip Stirrer Made from 4-Gal. Drum. Wire handle passed through stick acts as a guy.

ticks. An ineffective dipping of this nature is so much valuable time, labour and money wasted.

Remove Heavy Mud and Hair

During the 10 min. period immediately after a good dipping, while the effective ingredient is still suspended, the floor of the dip may be dredged by shovel or a tin on a stick to remove the heavier mud. The particles of the dip preparation discarded with these dredgings are too large to be effective at dipping. Furthermore, the chance inclusion of some of these large particles in a sample taken for analysis can give a false picture of the strength of the dip.

Hair may also be scooped from the surface of the dip—but this operation should *not* take place until the froth, which does contain useful material has subsided.

How Dip is Lost

We have seen that some active material can be lost (from the tick-killing point of view) by being trapped in silt on the bottom of the dip, especially when this is allowed to pack into a solid mass. The tickicide can also be lost in the hair and dung, which accumulates in the sump between the draining pen and the dip. This can be overcome by dispensing with the sump altogether and allowing the fluid from the draining pen to run back directly to the dip. Loss from these sources can be minimized by good dip management.

Cattle normally take away a quantity of active ingredient in their coats. This is called "stripping" and is mainly responsible for what is known as the "residual effect" of a dip preparation. Some tickicides lose strength by chemical breakdown in the dip. These sources of loss are beyond the dip-owner's control.

Keep Track of the Strength

Dangling a narrow-necked bottle on a string to obtain a sample for analysis was probably good enough with an arsenic dip—anyway, the local stock inspector could always test your sample in a couple of minutes. But with modern tickicides this method is not nearly good enough. Hair and scum in the neck of a narrow-mouthed bottle can filter out a quantity of active ingredient so that the sample ultimately obtained is not truly representative of the vat fluid.

Furthermore, although chemists are working toward that end, a quick dip-side test has not yet been perfected and analysis of modern dip preparations demands the skilful attention of a trained technician in a well-equipped laboratory.

Sampling Tool

Realising that lack of a suitable sampling tool was an obstacle to efficient sampling of dips, the Depart-

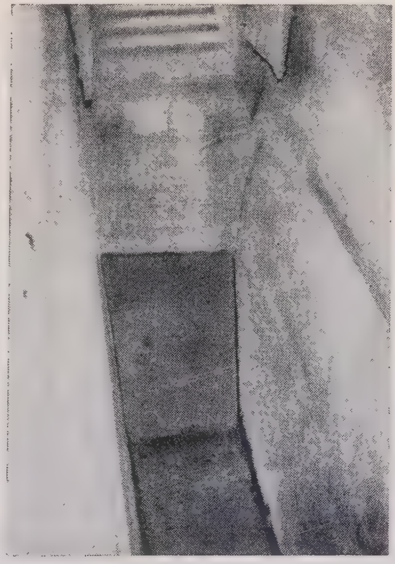


Plate 6.

The Corner at the Foot of the Plunge-In Wall Filled with Concrete to Minimise Deposition of Silt at this Point.

ment has developed the simple instrument depicted in Plates 1 and 2. This can be made by any handyman for a few shillings. It consists of an ordinary 1½ lb. jam tin fixed to a length of 2 in. x 1 in. timber, and a 3/16 in. metal rod, threaded at one end, running through two brackets on the "stick." Permanently fixed to the end of the metal rod is a jar lid of the type found on the common wide-mouthed 2 lb. honey jar.

To obtain a sample of dipping fluid, a jar of this type is placed in the tin and the lid on the rod lightly screwed on to it. *A thin smear of petroleum jelly on the inside of the lid assists its action.*

The tool is then plunged into the dip to a depth of about 3 ft. and about 3 ft. from the plunge end of the vat; the lid unscrewed by a twist or two of the rod and replaced on the jar after it has filled.

By this means a representative sample is obtained free from interference by surface scum and hair. Upon removal from the dip, the jar is fitted with another lid, which should contain a well-fitting rubber or other waterproof seal to prevent loss of fluid in transit. Any such loss will render an analysis of the remaining fluid worthless.

To obtain and despatch samples

1. Take sample *immediately* dipping is finished, preferably while the last beast is walking out of the dip.

2. Label carefully, showing your name and address, the proper proprietary name of the dip preparation in use, its formulation (liquid, paste etc.) and rate of dilution.

3. Complete a copy of an application form for analysis of dipping fluid (Form 225, available from your local stock inspector or from the Department's Head Office) giving clear answers to all questions. The analyst requires this information to enable him to identify quickly the material he is to deal with; to properly interpret his results and advise you accordingly. If anything, err on the side of giving *too much information* rather than too little.

4. Despatch your sample, in the jar in which it was collected, to the Biochemist, Animal Research Institute, Yeerongpilly. No fee is charged for analyses of dipping fluids (or water for use in dips) but freight on samples should be prepaid.

"Topping-Up" the Dip

"Topping-up" the dip means more expense. A sample carelessly taken may give a test well below the true level of the dip with the result that money spent on the addition of dipping concentrate in such a case would be largely wasted. Remember, good sampling saves money.

In "topping-up", as in charging a dip, remember also to stick closely to the manufacturer's instructions concerning preparation and mixing of the material. It is a good practice to add fresh material to the dip just prior to dipping cattle as this usually ensures a good mix. A fresh sample for analysis should be taken after this dipping to serve as a check on the effectiveness of the "topping-up" process.

Guard Against These Ailments In Your Horses

By R. MILLAR, Veterinary Officer.

The overall well-being of horses, like all other animals, is dependent firstly on their condition. It may seem odd to say that an adequate diet is essential, but there is no doubt that, in many cases, deficiencies in the diet are often attributed to more mysterious things, such as parasites and the like.

Veterinary scientists are often asked to perform some feat that will make up for improper or inadequate feeding. Naturally, this cannot be done. But what can be done is to ensure that an animal is healthy and able to make the best use of a proper and sufficient diet.

There are times in the lives of horses, as with other animals, when a satisfactory diet is an absolute essential. Two important stages are during pregnancy in mares, and at weaning and immediately after in foals. In spite of this, it is common practice to say, " Oh! She's in foal, turn her out," or to turn out the foals after weaning into the paddock there to stay until they are wanted.

Having established that sufficient food has been available, there are many ailments and diseases that can occur to interfere with horses' condition.

Teeth.

Naturally, if the teeth are in bad condition, the grasping and chewing of food is upset. This is the first link in the digestive chain, and is thus of primary importance. The action of grinding food by the molar teeth is from side to side. The opposing faces of the upper and lower grinders are inclined in opposite directions. Thus, the outside edge of the upper molars and the inside edge of the lower molars tend to get sharp. These sharp irregularities injure the tongue and the inside of the cheek and stop proper chewing.

Often the food forms into balls inside the cheek. These small balls will often fall out in the manger or in the paddock in bad cases.

The sharp edges of these teeth can be rasped off, and special tooth rasps are available for this purpose.

In older horses, teeth must be inspected regularly and treated if necessary. Your veterinary surgeon will assist you in this matter.

Colic.

This term is used to describe a number of conditions characterised by abdominal pain in the horse. It may be caused by things as different as indigestion and parasites. Generally, however, changes in feed, lush feed, dry feed, poor quality feed give rise to indigestion and colic. Abstinence from water and a sudden fill after a feed will often bring about colic.

Symptoms include abdominal pain, varying from acute pain with rolling and sweating to dull persistent pain going on for weeks. Generally, the more acute the type, the better the chance of recovery. There may be

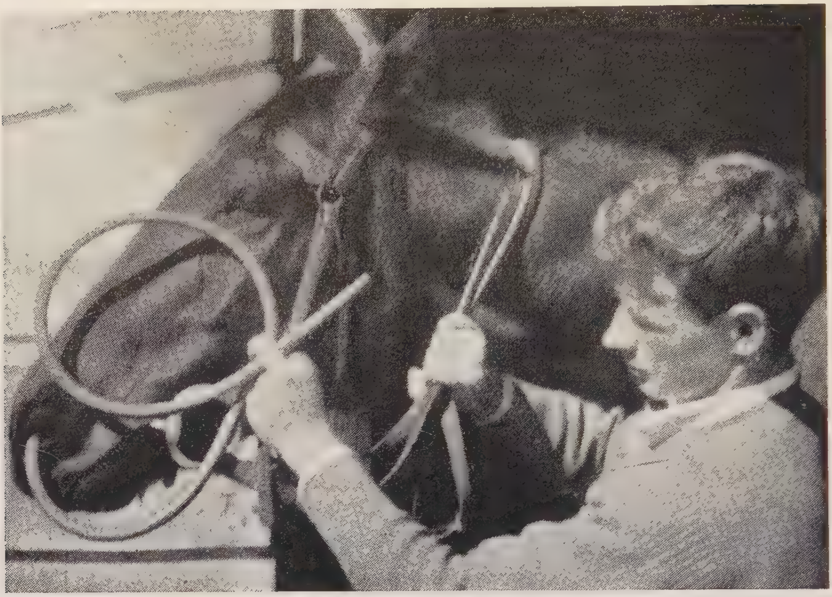


Plate 1.

Stomach Tube for Drenching, Showing Tube in Position in Nostril.

constipation or diarrhoea, the action of the bowels varying according to the cause.

Treatment.—Many home remedies have been acclaimed according to their result. Turpentine, linseed oil, liquid paraffin and many others have been successfully used by horse owners.

Today, veterinary surgeons have anaesthetics and "tranquilisers" and a wide variety of drugs that make the modern treatment more effective and much easier.

Parasites.

There are several parasites that affect horses. Again, one must stress the importance of good feeding in relation to the balance between the condition or health of the animal and the number of worms present. It has been established that animals on poor feed and in low condition tend to become more favourable hosts to parasites. This does not imply that adequate feeding will lessen the number of parasites in horses, but if the horses are well fed, the ravages of the parasites are less. Foals which are well fed will show less loss of condition than those on poor feed and with an equal parasitic infestation.

The response of horses to parasitic treatment will be much better if they are well fed, both before and after treatment. Generally, treatment alone is insufficient unless nursing is equally thorough.

The three most common parasites of horses are, (*a*) red worms, (*b*) large round worms and, (*c*) bots. In any parasitic life-cycle, there is a most favourable time to attack. Thus it might be as well to stress this time in respect to these three parasites.

(*a*) *The Red Worm.*—These are of the greatest economic importance. The adult red worm lays eggs which pass out in the droppings. Here they undergo rapid development and become infective. They are then picked up by the new host during grazing. Having been swallowed, they undergo development in the bowel, then they pass through the bowel wall. Here they get into the blood stream and migrate throughout the organs of the body, eventually returning to the lumen of the bowel as adult males and females to start the cycle over again. They are blood suckers and, if present in sufficient numbers, will cause severe anaemia. In addition, they cause considerable damage during their migration through the animal's body.

Thus, the only time to treat these is when they are in the adult stage in the bowel. Drugs cannot reach them at any other time. Rotational grazing of paddocks will help as will the harrowing of pastures to break up dung pads. Drenching is most effective in the autumn or early winter, as the worm eggs are picked up during the summer months.

(*b*) *The Large Round Worm.*—It is often inferred that large round worms are not important, but experience shows that in foals they are. The life history is the same in general as the red worm. Here again, the only time to attack this parasite with success is during the adult stage in the bowel. Foals must be treated before they are weaned and again as yearlings.

(*c*) *Bots.*—Bot flies lay their eggs round the muzzle, under the jowl, or on the legs of horses. The eggs hatch into larvae which bore through the skin and reach the circulation and subsequently settle in the stomach. Here they attach themselves to the wall. Again, the only satisfactory time to treat is when the bots are in the stomach.

Various suggestions have been made as to methods of destroying the eggs on the hair but up to now, none has been satisfactory. As soon as the bot fly ceases to be active in early winter, all horses should be drenched.

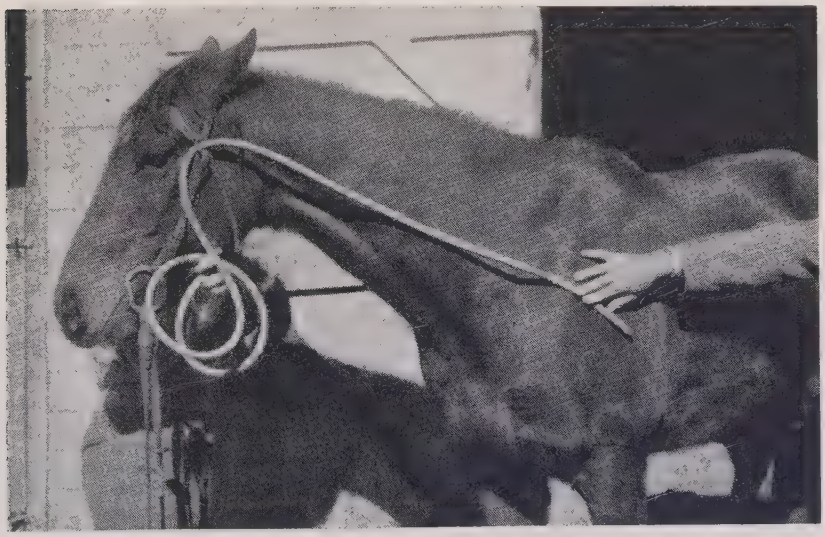


Plate 2.

Stomach Tube, Indicating Course Taken Down Food Pipe to Stomach.

The symptoms of parasitic infestation in horses and foals vary, but poorness, diarrhoea, pot-belly and general unthriftiness are most common. Circulatory symptoms and peritonitis, colic and death often occur in the later stages. Treatment must be specific for each—there is no "blanket" treatment for them all.

The red worm is treated with phenothiazine, the large round worm with piperazine and carbon bisulphide is the drug most effective against bots.

There is little doubt that the stomach tube is the safest and most effective method of administering these drugs. Carbon bisulphide is irritant and, unless given by the nasal tube, needs handling with care.

The stomach tube can be used to give a large quantity of fluid, which is an advantage, and also all drugs can be given at once. This should be done by a veterinary surgeon, as the passage of the nasal tube can be both dangerous and fatal in unskilled hands. Any treatment for parasites must be supplemented by good feeding.

Strangles.

Strangles is an infectious disease of horses caused by the organism known as *Streptococcus*. This will spread through a mob with amazing thoroughness and rapidity. It is often advisable to isolate new purchases, especially if they come from a sale-yard or public auction.

Symptoms—The horse goes off its feed and becomes dull, and often difficulty in swallowing is noticed. It runs a high temperature and its nasal and eye membranes become reddened. Often a cough starts, a sore throat is noted, and a thick discharge appears from one or both nostrils. The glands under the jaw or below the ears swell up and eventually burst. Similar swollen glands may appear at the back of the sheath and around the anus.

Treatment.—Isolate all healthy animals, and as soon as these show any rise in temperature they must be put with the infected. Disinfect all in-contact materials, clothing, water utensils, feeders, brushes and so on. It is claimed that penicillin and other antibiotics are useful—they are in the initial stages, and heavy doses every 24 hours may help. The disease tends to run its course, however, but pneumonia and other secondary affections may be lessened with treatment.

It seems that many horse owners are not aware that there is quite a good vaccine available against strangles. Recent purchases or horses from public sales, should be isolated and vaccinated. Vaccination has little curative value; it has a preventative value and this should be used before symptoms occur. It is felt that vaccination should be practised more widely as it either prevents the development of the disease entirely, or renders it much less severe. Its use will also prevent minor respiratory troubles.

Strangles is a good deal more serious than is realised and long convalescence and good nursing are essential. Often, starting horses working too soon after an attack is followed by further changes in the heart and lungs. These "post strangles" complications may often be fatal.

Tetanus

This has always been an important disease of horses. The germ is frequently carried in the intestines of normal horses and passed out in the dung without causing any trouble. The poison must reach the nervous system to cause symptoms. The infection in tetanus is almost always associated with a wound, although some cases have occurred where no wound is visible.

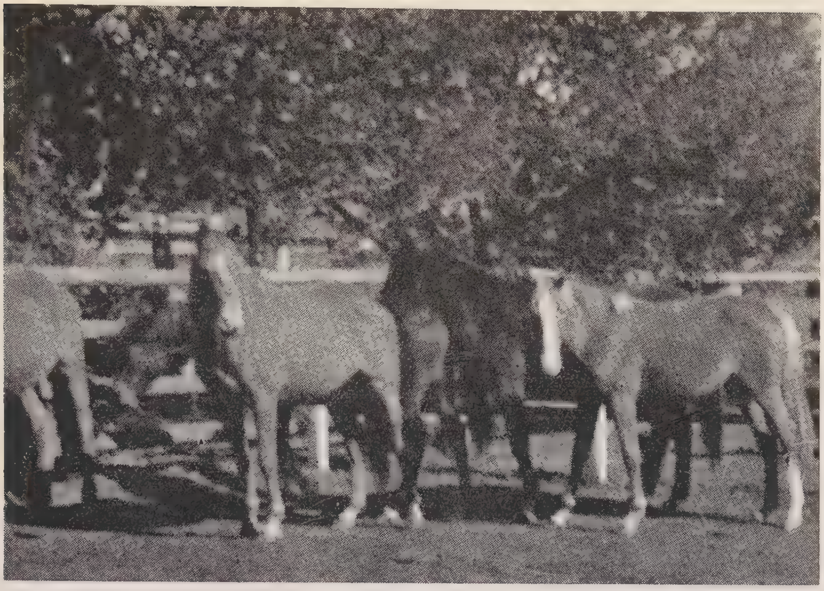


Plate 3.

Young Horses in Shady Yards.

Symptoms of tetanus may appear from 4 to 20 days after infection of the wound has occurred. The organisms like to get buried and out of the air before they develop, thus the healing wound is generally the cause and seldom the fresh wound.

Symptoms.—These are well known to most horsemen. After the wound has started to heal, the horse goes stiff, as with laminitis. A peculiar "proppy" gait and stiffening of all the muscles occur. These symptoms are precipitated by fright or movement, and the animal will then go into a complete spasm all over. If the spasm persists, profuse sweating will start.

The diagnostic symptoms are that the third eyelid slips over the eye when the chin of the horse is gently raised away from the ground, and when the head is lowered it slowly retracts to its normal position. In advanced cases it remains protruded. The tail has a peculiar position and often tends to stick out like a pump handle. This is due to a spasm of the back and loin muscles. As the disease progresses the nostrils become dilated, the limbs stiff and the abdomen drawn up. The animal tends to go into a perpetual state of spasm and goes down. The distress is obvious, sweating is profuse and destruction is inevitable.

The characteristics of the disease are shown by all animals alike—sheep, pigs, cattle and man. So, if you have seen tetanus in one species, you can imagine what it is like in the rest.

Prevention.—Tetanus can be prevented by inoculation. Many of you have had your children immunised against this disease—if you have not, you should. The same applies to horses in any breeding or racing establishment. The initial vaccination is carried out with tetanus toxoid. A "booster" injection should be given 12 months later and for greatest protection this should be repeated every three years. This gives a high degree of protection from tetanus. Three weeks or a month before any operation, such as castration, toxoid should be given. The time factor is important, as the animal has to develop its own resistance. Giving the injection the day before may be of no use. In such a case, antitetanic serum should be used for immediate short-term protection as well.

Treatment.—In the initial stage of symptoms, tetanus anti-toxin can be used, but the result of this is very variable; generally, it is of no avail. If it is to be of any use, it must be used early and in maximum quantities. Anti-serum is also useful for short-term protection of non-immunised animals suffering penetrating wounds which are likely to become infected. The successful treatment of tetanus is best handled by a veterinary surgeon. Not only is he familiar with the procedure but he has narcotics and other drugs available that are essential to the successful treatment of this disease. Prevention of tetanus in all animals and man is the ideal method. Treatment should not be necessary today.

Lameness.

Today, the motorist expects to have the puncture mended and the spare wheel put in the boot an hour later. The same is expected of horses that go lame. You are expected to put the matter right at once, so that the horse can go again tomorrow. But it must be remembered that any sudden cause of lameness, a nail in the foot, or blow on the tendons, will cause an immediate change from soundness to lameness. It must also be remembered that the reversal of this process is not so sudden and may even be prolonged over weeks or months.

Recovery, even with adequate and proper treatment, is only a natural process which can be helped or impeded by man's interference. The natural process of recovery may be accelerated by heat or cold, with or without rest and exercise, as well as the application and use of many remedies. So, in dealing with lameness, one is forced to state the old maxim, "No foot, no horse."

There seems so little knowledge available to people today on the importance of horses' feet, yet this is the vital matter, for neglect will soon bring about lameness of one sort or another.

So often, one sees horses turned out and literally forgotten. When this happens, it is not unusual to find deformed feet, split hoofs and all the rest.

Now it must be remembered that the hoofs grow in the same way as finger nails. Everybody knows that unless these are cut, they grow at an alarming rate. The manicuring of horses' feet is equally important. They must be kept even and rasped down every few weeks. Not only is this important to give the horse an even, level foot on which to walk, but it also stops splitting up the wall. An uneven sole and wall will alter the mechanics of walking, upset the distribution of weight into the foot and leg. Splits in the wall allow dirt to work in to the tissue and abscesses in the foot will result.

Often people think turning out horses with shoes on absolves them from taking any further interest in their feet. Over-grown feet will extend over the edge of the shoes. The shoes become loose and the clenches then tear off the edge of the wall, so that when you want to put on a shoe, there is no wall left to nail through. The loose shoes wrench off and the horse stands on the toe-clip. This will give rise to abscess formation. In the worst cases the toe clip can injure the bone or ligaments in the sole of the foot above the frog.

Plate 4.

Feeding Brood Mares.

Horses turned out with shoes on, require to have those shoes removed and their hoofs rasped back every month or so, according to growth of hoof. This is essential so that when the animal is needed it has a well-shaped foot which can be shod for work.

The maladies higher up the legs from which horses suffer often have their origin in neglected feet. On the other hand, there are many strains and bone enlargements that come from work. Often these complaints are the result of hereditary factors. There is no doubt that they tend to follow certain families and certain breeding lines.

The fact remains that both heredity and neglect bring on many types of lameness. The diagnosis of lamenes is often not difficult but the assessing of the future of the animals is more difficult.

The object of these observations is to bring before horse-owners a few of the common conditions affecting horses. It must be appreciated that, as with all animals, prevention is the first and most economic way of defeating any ailment.

◆

Planting Irrigated Pasture

Failure of a planting of irrigated pasture is often due solely to skimpy land preparation. Cultivate the land well, particularly after rain, to destroy germinating weeds. Weedy seedbeds mean thin stands and unthrifty growth of pasture.

Delay planting for week if the land is not in good tilth. A week's work on land preparation will more than compensate for a week's delay in planting. Land which has been graded in preparation for border irrigation should be given a light corrective grading to smooth out small irregularities before planting.

A well-graded field is easier to water and makes more effective use of the irrigation water.

—A. NAGLE, Irrigationist.

Save Your Sows From Agalactia

By T. ABELL,
Senior Adviser, Pig Branch.

Agalactia—little or no milk in brood sows—is increasingly a cause of loss under present day intensive pig farming conditions.

SOWS which develop agalactia usually lose their litters unless some measures are taken to help the piglets. Any survivors make a slow start in life and are seldom profitable to rear.

These notes will help farmers to recognise the symptoms of agalactia early, so that prompt and appropriate treatment may be arranged. What is more important is that farmers will learn something of the causes, and the preventive measures required. This will help to eliminate many agalactia cases which occur at present because of insufficient information in the hands of pig raisers.

Agalactia in pigs is a condition found only in sows which have recently farrowed. It is most aptly described as a complicated series of disorders arising from many different causes, all with a common symptom—little or no milk.

As a sow's lactation is upset easily, and the litter depends entirely on her during the first few days of life, sows should be protected from agalactia. Once it appears, the piglets will lose weight and strength until the sow recovers.

Normal Lactation

A normal lactation is governed by a number of hormones whose influence starts early in pregnancy. Hormones prevent the occurrence of heat periods during pregnancy, and start a slow building up of the udder tissues. This udder development is not obvious externally for many weeks, but internally the milk secreting tissues get ready for their work long before farrowing. The final development to start lactation is rapid, and left until very late in the pregnancy of normal sows. In fact, one type of agalactia is due to too late development of the udder tissues.

A healthy sow will have milk in her teats whilst she is farrowing, and it is common for piglets to suckle while others are being born. After about a day, the litter develops a mealtime teamwork routine which they maintain until weaned. With their snouts, they nuzzle and push at the sow's udder. This vigorous massage stimulates the sow's glandular reactions controlling "let-down" of milk. After a minute or two of active massaging the litter is suddenly quiet, busily drinking for a short time. The stimulation brings a pituitary hormone into the udder, and this causes the cells to contract and squeeze milk into the teats.

This process occurs at every feeding time, but during the periods between "let-down," milk cannot be squeezed from the teats. This means that the piglets only drink when they cause the normal contented sow to release milk following udder stimulation.

In agalactia cases, some milk can usually be squeezed from the teats during farrowing, but soon after, milk flow ceases. The udder generally becomes hard, and there is no "let-down," no matter how the piglets massage it. One indication of a sow with agalactia is a restless litter, with every pig hollow and hungry.

Causes of Agalactia

Agalactia may be caused by:

1. Glandular troubles
2. Disease
3. Faulty management

Glandular Troubles include lack of development of udder tissue, and failure of the hormone system to stimulate milk secretion or "let-down."

An extra grouping could be added to cover hereditary factors such as poor milking strains, and those cases with no obvious symptoms.

This list of causes shows clearly why one treatment will not cover all cases, and why indiscriminate use of hormone treatment so often fails.

Disease.—Sows which farrow whilst suffering from a systemic disease and develop agalactia do so because the whole body system, including the milk secreting cells, is not functioning normally. Such sows have agalactia simply because *there is no milk to squeeze out.*

With mastitis, the milk-producing cells are blocked, and agalactia occurs because *milk cannot be squeezed out.* Mastitis is often allied with some other complaint, and so milk secretion is also limited. Both conditions then have to be treated to restore lactation.

Shock due to the strain of an unduly prolonged or difficult farrowing, and dietary deficiencies, for example, calcium, may also cause agalactia.

Faulty Management.—Under this heading are many of the causes which the farmer can control, such as wet, cold floors and bedding; cold draughty pens; impaction; lack of exercise; faulty feeding; insufficient water; sows too fat; premature farrowings due to injury, and so on.

Symptoms of Agalactia

There is a good deal of variation in the symptoms shown by agalactia cases, due to the different origins. The symptoms listed here do not always appear, but a combination of several is just as likely to occur. These symptoms are useful in determining the cause of, and the appropriate treatment for, each agalactia case. Therefore, it is important to note accurately any abnormalities, as under the following headings, which accompany lack of milk.

Lack of Appetite.—The first sign a farmer is likely to note is refusal of food. Normal sows usually eat within a few hours of farrowing, but a sow with agalactia isn't much interested in food.

Temperature.—The sow's temperature is usually normal, but it may be from 103.5 deg. F. to 105 deg. F. or even higher in some cases.

Udder.—The udder may be soft after farrowing or it may be congested, reddened, painful, and hard, particularly if mastitis develops concurrently. A sow with acute mastitis will often lie on her belly and push aside the piglets trying to suckle.

Discharge.—A brownish or yellowish discharge from the vagina may occur. This usually indicates a pig or membranes retained, or an infection of the uterus (metritis).

Staggering.—Sows may wobble or sway when walking, and even find it difficult to rise. These symptoms of affected movement may appear at any time from farrowing up to 3 weeks later. They are generally due to impaction and/or milk fever (calcium deficiency).

Other symptoms occur. The general effect of agalactia is to make the sow either irritable or torpid.

Treatment

The sooner appropriate treatment is given the quicker the milk supply will be back to normal, and the smaller the setback suffered by the litter. Therefore, as soon as you suspect agalactia get in touch with a veterinary surgeon, an advisory officer of the Department's Pig Section or an Inspector of Stock. Each case of agalactia must be treated according to the cause. Home treatment with drugs normally kept on the farm may do much harm if the wrong treatment is chosen.

When the need for treatment arises, it should be regarded as a warning to check management practices. Don't forget the litter while the sow is sick. Let them suck the sow, as they may get a little milk, and their massaging of the udder assists in clearing congestion. However, there is a risk of the sow overlying or savaging piglets trying to feed at painful udders. In these cases it is advisable to keep the piglets in a warm box, and put them to the sow (while observed) for a short time every few hours.

If they are weak, give each piglet a teaspoonful or two of a saturated solution of glucose dissolved in clean, boiled water at feeding time until they recover, or have been transferred to artificial feeding.

Sows usually recover quickly with proper treatment, taking three or four days. If recovery is delayed it will be necessary to feed the litter artificially.

Preventive Measures.

Scientific knowledge of agalactia is at present limited, so we must depend on management practices long regarded as useful in preventing agalactia. They are not cures, but aids to ensure normal farrowings. These practices start at mating, and not just before the sow farrows.

Records.—By keeping breeding records you know when each sow is due to farrow and can arrange feeding and management with a definite date in mind. The sow can be penned alone two weeks before farrowing, safe from bullying and injury, and given any individual attention required.

Exercise.—Sows are natural foragers and the exercise thus obtained keeps the in-pig sow fit. Half an hour in a grazing paddock daily for penned sows helps to prevent impaction, and maintains activity.

Feeding.—Rations after mating must supply the essentials to restore the sow's condition and allow the unborn litter to develop. It is important that she be given enough protein, minerals and vitamins to prevent exhaustion of her own body reserves. By controlling the amount of food, you will also avoid making her overfat; sows in good breeding condition are less likely to develop agalactia than very fat sows.

Sudden change in the diet before farrowing can be harmful. The better plan is to start when the sow is penned, and gradually reduce or change the feeding if necessary. By adding a handful of bran at this stage, and providing soft green feed, impaction will be unlikely.

At Farrowing.—Try to provide a clean, dry shed, free from draughts, and warm in winter. Cold or wet floors will cause trouble.

Healthy sows seldom experience trouble when farrowing, so resist the temptation to interfere unless necessary.

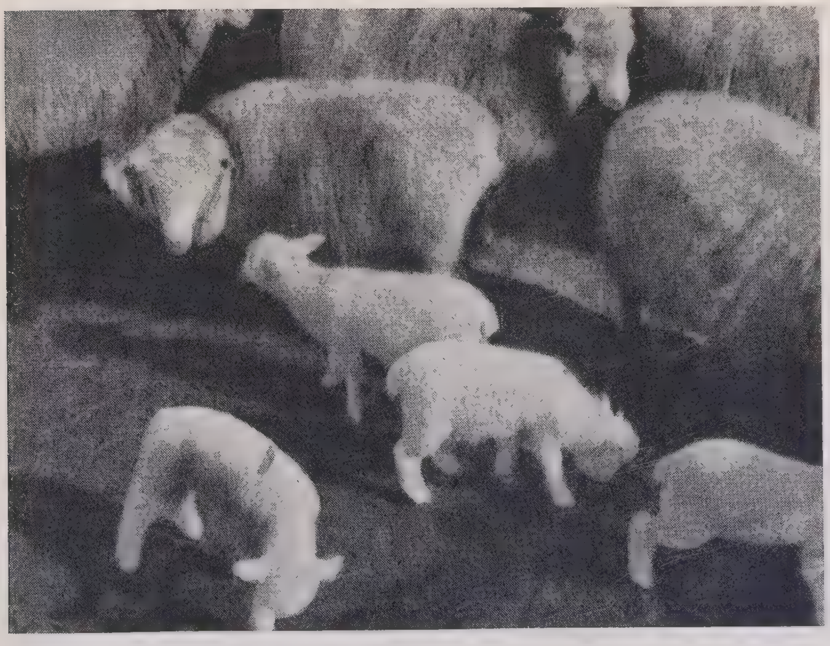
A normal farrowing may take up to eight hours. If a farrowing sow strains for an hour or more without results, or has not passed the afterbirth an hour or two after the last pig's arrival, it is advisable to provide skilled assistance. These farrowing difficulties often lead to agalactia unless prompt action is taken.

Inexperienced meddling is very likely to lead to infection in the sow's breeding organs, followed by agalactia. It also makes successful treatment more difficult.

After Farrowing.—The general rule is to feed sows lightly the day they farrow, and then build up to full rations as quickly as possible without upsetting either the sow or litter. The bran is generally continued for a few days after farrowing, as neglected sows often become impacted during this period. Ample clean drinking water is essential during lactation.

Modern farming demands a high standard of performance from stock. Sows which break down under the strain of meeting these conditions may again develop agalactia at a later farrowing.

When agalactia occurs it will rob you of profits, and caring for both sow and litter will make extra demands on your time. However, a planned system of sow management, together with a little "stock sense", will go a long way towards eliminating agalactia, with the expenditure of very little extra time daily during the year.



Corriedale Ewes and Lambs by Dorset Horn at Theodore Experiment Station.

The Egg and I. Q.*

By B. W. MOFFATT,
Poultry Adviser.

** Internal Quality*

High temperature and low humidity are the egg's worst enemies, for, as temperatures rise, egg quality falls rapidly. There are a number of other causes of loss also and these must all receive the farmers' constant attention in an effort to improve the over-all quality of eggs. This will mean more money in his pocket !

From the structure of the egg (Plate 1) it can be seen how deterioration occurs and why it is so rapid. The shell is made up of nearly pure calcium carbonate. It is dotted with a number of minute pores provided by nature to allow oxygen to diffuse into, and carbon dioxide to diffuse out from, the developing chick. These pores also allow water to evaporate from the egg.

Beneath the shell are two shell membranes enclosing the contents of the egg. They are the inner and outer shell membranes. The outer shell membrane adheres closely to the shell. When the egg is laid it has a temperature of about 107 deg. Fahrenheit, but it immediately begins to cool. This cooling causes the contraction or shrinking of the egg contents and results in the formation of the air cell at the large end of the egg due to the inner shell membrane moving away from the outer shell membrane.

This air cell then gradually increases in size, and is used as a guide in determining the egg's age.

The white, or albumen, consists of four layers but these are often difficult to define in the broken out egg. These layers of albumen consists of two thin layers, a thick layer and the chalaziferous layer which holds the yolk in suspension. The chalazae can usually be seen in the broken out egg as two twisted, whitish cords of thick albumen attached to the yolk.

In the fresh egg (Plate 2), the proportion of thick albumen to thin is high. Because of this, the fresh egg does not spread far when broken out and a wide layer of thick white is seen surrounding the yolk. The yolk stands well up in the thick albumen and is nicely rounded on top.

The yolk is enclosed by a membrane called the vitelline membrane. This membrane is surrounded by the chalaziferous layer of albumen and the chalazae keep the yolk suspended in the middle of the egg.

As Time Goes By

You may now appreciate what happens as the egg ages. The formation of the air cell occurs immediately after laying and increases in size as water evaporates from the egg. High temperatures and low humidity speed up this process. A few days in summer can give the egg a stale appearance when candled because of the large air cell.

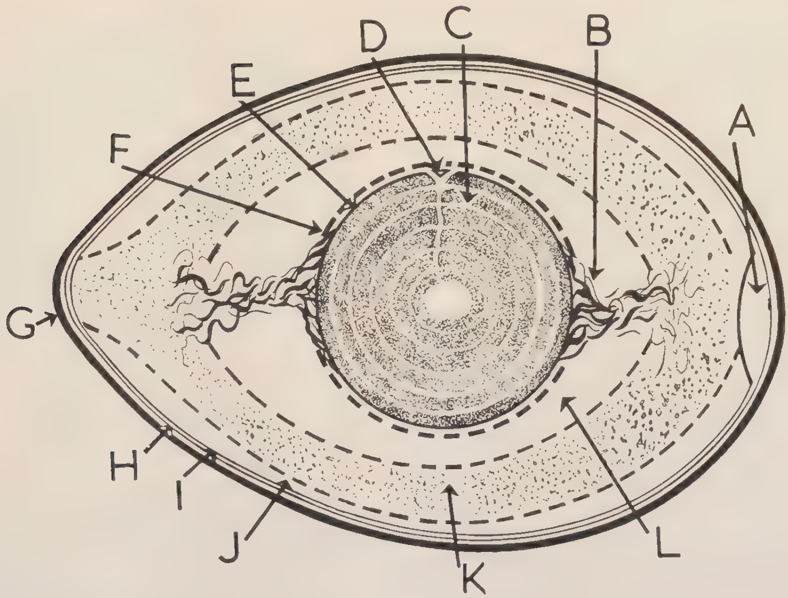


Plate 1.

The Structure of the Egg as Seen in Cross Section.—A.=Air Cell. B.=Chalazae. C.=Yolk. D.=Germinal Disc. E.=Vitelline Membrane. F.=Chalaziferous Layer. G.=Shell. H.=Shell Membrane (Outer). I.=Shell Membrane (Inner). J.=Thin White (Outer). K.=Thick White. L.=Thin White (Inner).

This will lead to the egg being down-graded, and so bringing a lower return to the producer.

In addition to the evaporation of water from the egg, some water inside passes from the white to the yolk. This leads to a breakdown of the thick to thin white and an increase in size of the yolk. As the yolk increases in volume, the vitelline membrane is weakened, thus giving the stale egg its characteristic flattened appearance (Plate 3). When broken out, there is little or no thick white and the egg spreads over a wide area.

A stale egg, when candled, besides showing the enlarged air cell, will also show a dark yolk shadow. In the fresh egg, the thick white prevents the yolk showing as a dark shadow and the yolk is barely visible.

There is no Cure

It is of no avail looking for a cure, for the changes in quality which take place within the egg are irreversible. Quality is not difficult to maintain provided due attention is paid to those factors which affect quality, namely—time, temperature, and humidity.

Time.—The time taken for the egg to reach the table from the nest is of the utmost importance, particularly in summer time. The farmer can play his part by marketing his eggs at least twice a week. The storekeeper and the consumer can assist also by purchasing eggs more frequently.

Temperature.—Heat-affected eggs are the most common cause of downgrading in summer. Heat increases the evaporation of water from the egg and increases the rate of breakdown of thick to thin white. Eggs kept for three weeks at 60 deg. F. will be in just as good condition as eggs kept for one week at 80 deg. F.

The essentials in solving this part of the problem are to remove eggs quickly from the nests, allow them to cool rapidly, pre-cool them before packing and then hold them at cool temperatures before marketing.

Eggs should, therefore, be collected at least three times a day, preferably more often, in wire baskets. These allow a greater circulation of air round the eggs than do buckets and tins and so allow the eggs to cool more rapidly.

As egg cases do not allow rapid cooling, eggs should be pre-cooled before packing. Most farms have no facilities for cooling and so eggs are often packed when still warm. Cases also are not stored in cool rooms before marketing. But the solution to this problem is not so difficult as many people imagine. Refrigerated rooms at a temperature of 55–65 deg. F. would be ideal for the purpose of cooling eggs. However, a cheaper method of cooling is available in the form of charcoal coolers (Plate 4). These are often referred to as evaporative coolers because they use water evaporation to keep the contents cool. Under our summer conditions, these coolers could be expected to reduce the temperature to the 60–70 deg. range, which would be a vast improvement on existing holding conditions.

Under the heading of temperature, broodiness and hot nests should also be mentioned. Broody birds sitting on eggs in the nest keep the eggs close to body temperature and deterioration of quality is rapid. Broody birds should be removed from the nest immediately they are noticed and placed in a broody coop. Nests, particularly those with iron roofs, in the front of sheds are usually excessively hot. Consideration should be given when constructing nests to see that they are well ventilated and not likely to be too hot in summer time. The painting of iron roofs with a silver paint will reduce the inside temperature of the shed.

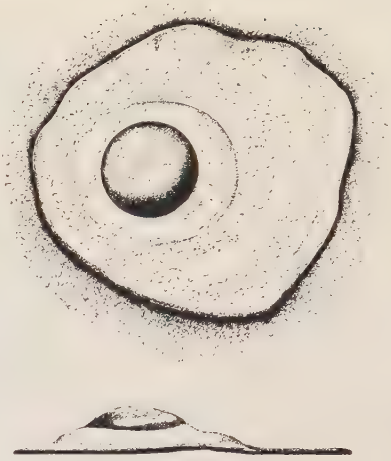


Plate 2.

A Fresh Egg When Broken Out Will Not Spread Far in the Pan. Note the high proportion of thick to thin white. The yolk is rounded on top and stands well up in the thick white. Compare with the stale egg in Plate 3.

Humidity.—Humidity is often sacrificed for coolness. This is noticed when eggs are kept under a house, where the breeze will cool them. It should be realised that this breeze will also dry them out and give them that second grade appearance on candling.

When the atmosphere is dry (that is, low humidity) the egg will naturally lose water more rapidly. By increasing humidity, the rate of evaporation is lowered. Therefore the ideal is a cool, humid atmosphere such as in a charcoal cooler. If refrigeration is used, humidity can still be a problem, for there is a drying-out effect. Humidity should be kept to 80–85 per cent. Above this

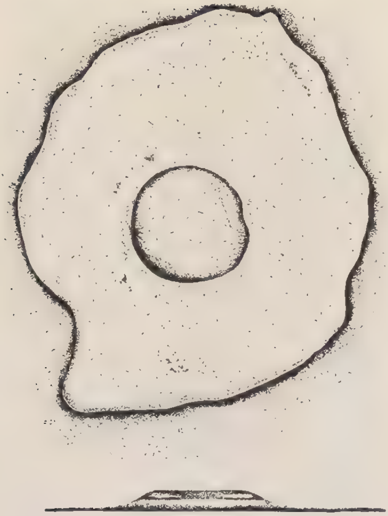


Plate 3.

The Stale Egg When Broken Out Spreads over the Pan as the Thick White has Broken Down to Thin White. The vitelline membrane has weakened and so the yolk shows this flattened appearance.

percentage, mould growth on eggs is likely to be a problem but if marketing is done twice weekly then no damage should result.

Through low humidity and loss of water from the egg, the farmer can lose money when his eggs fail to meet the weight standards. This will only occur where weights are borderline but it can mean the difference between first grade hen and first grade small hen, a difference of at least 6d. a doz.

Use of Coolers on the Farm

In some parts of the U.S.A., wholesalers will only buy eggs that have been kept in coolers on the farm before marketing. This practice shows the emphasis placed on farm cooling of eggs.

Charcoal coolers would not be so effective as a properly constructed cooling room equipped with refrigeration and a humidifier, but they would at least guarantee reasonable egg holding conditions. Their big selling point is the low cost of installation, and their cost of running is negligible.

The charcoal cooler consists of a small room, preferably with a cement floor, the walls and roof being made of charcoal which is held in place by wire netting or slats.

The room need only be large enough to hold half the week's egg supply in cases, in addition to a day's collection held in baskets. An insulated door is very desirable. Water is allowed to drip onto the charcoal, or in many cases the charcoal is thoroughly wet each day. The charcoal provides a large evaporative surface for water, which takes heat from its surroundings to evaporate. This reduces the inner temperature of the cooler, at the same time maintaining a high humidity. In southern Queensland, the maximum temperature inside a charcoal cooler is not likely to be above 72 deg. F. and the humidity would be 80–85 per cent.

Eggs collected in baskets should be immediately placed in the cooler and allowed to cool before packing. When packed ready for market, the cases are then stored in the cooler. With the lower temperatures obtained in refrigerators, moisture is likely to condense on eggs when they are taken from storage, causing "sweating." However, the temperature of charcoal coolers is not low enough to cause "sweating" when the eggs are taken from the cooler. Sweating is undesirable, as moisture assists moulds and bacteria to penetrate the pores of the egg shell with ease. Dirty marks can also be left on eggs if they are handled in this condition.

Other Common Egg Faults

Beside the processes of deterioration already described, a number of other faults can be responsible for eggs being down-graded. These egg faults represent a definite loss to the farmer and in many instances can be easily corrected. An important point often overlooked is the bad effect that such eggs have on sales if they reach the consumer.

Egg Size.—Egg size depends largely on the breeding of the bird. Farmers should choose a strain that they know will give a high percentage of first grade eggs. It should be realised, however, that the production of oversize eggs such as those averaging 2½ oz. would not be very profitable because of the extra feed required to produce the weight of eggs. Breeders should aim at producing birds that will lay eggs averaging 24–26 oz. to the dozen.

Thin shells.—Whilst the thickness of shell is an inherited trait, it also depends largely on the feeding practices. The ration should contain calcium and phosphorus, manganese and vitamin D_3 in correct proportions. It is also desirable to feed good quality shellgrit or limestone grit at all times. Thin shelled eggs will lead to a high percentage of cracked and broken eggs during handling and transport to and from market.

Porous Shells.—When porous shell occurs, the shell appears mottled. The egg loses moisture rapidly because of the porous shell and will thus not retain its first grade quality for any length of time. The fault lies in the breeding of the bird.

Yolk Colour.—The consumer prefers an orange-coloured yolk to a pale one. The colour of yolk is due to a pigment contained in green feed, yellow maize and lucerne. Good yolk colour can be obtained by feeding lucerne meal and maize meal in the mash if green feed is not used.

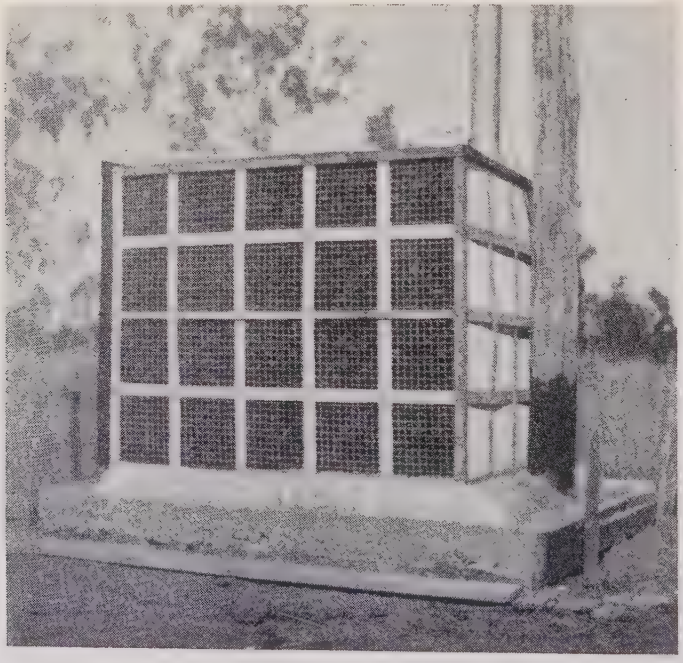


Plate 4.

Side and Back View of a Charcoal Cooler. This type of cooler would be a cheap and effective means of cooling eggs on the farm.

Plate 5.

All Eggs Handled by the South Queensland Egg Marketing Board are Candled by This Method to Detect Internal Faults.

Individual birds vary in their ability to transfer pigment to the yolk.

"Blood" and "Meat" Spots.—Eggs are frequently found that contain a clot of blood or blood dispersed through the white. There is still doubt as to whether "meat" spots are actually tissue or degenerated clots of blood. These faults are easily detected by candling. The blood usually originates from the rupture of a blood vessel at the time the yolk is ovulated from the ovary. It has been established that this is an heritable condition so the answer lies in breeding. However, it is difficult to detect birds laying such eggs in a breeding flock.

Fertile Eggs.—Quite frequently, eggs have to be down-graded because on candling they are found to contain a developing chicken embryo. These eggs are inedible. Cockerels should not be run with pullets except when eggs are required for hatching. Fertile eggs not set for hatching should be kept below 68 deg. F. to prevent development commencing. In summer time, Queensland temperatures are sufficiently high to start the incubation process.

Dirty Eggs.—Dirt or stains on the shell detract from the appearance of the egg and so it has to be down-graded. It is well known that dirty eggs will not keep so long as clean eggs, for dirt is teeming with bacteria and moulds, which if they gain entry through the shell soon affect interior quality.

The aim should be to produce clean eggs rather than to clean dirty eggs. The washing of eggs should be avoided at all cost. It removes the "bloom" from the shell and allows bacteria and moulds to gain an easy entry. Most cases of black rots in eggs can be traced to washing dirty eggs. Dry cleaning with steel wool is to be preferred or where necessary the egg can be wiped with a clean, damp cloth. It cannot be over emphasised here that the cloth must be clean or this practice would be no better than washing.

The cleaning of eggs is time-consuming. This is an extra point in favour of the production of "nest clean" eggs. It is not difficult to produce clean eggs if attention is paid to the cleanliness of sheds, nests and yards. Dirty floors and yards can lead to soiled eggs, the birds carrying dirt to the nests on their feet. The type of nest, the material used in nests and the number of nests per shed are all important factors. At least one nest to every five birds should be allowed. There should always be a good depth of clean, dry litter in the nest. Pine sawdust or shavings or a mixture of these make good nesting material. Hardwood sawdust and shavings should be avoided because they are likely to

Plate 6.

Eggs Being Packed in Cartons after Candling at the South Queensland Egg Marketing Board.

stain the eggs. The frequent collection of eggs from the nest reduces the number of broken ones, and so aids in the production of clean eggs.

Semi-intensive yards in wet weather can be a problem. This can often be overcome by filling in wet areas with ashes. If this is not entirely successful it may be desirable to make birds walk over clean floors or a wire netting ramp to get to the nests. This will remove most of the dirt from their feet.

Black Rots.—Black rot is a condition brought about by an organism entering the egg and causing complete putrefaction. The egg when candled is completely black. Unfortunately these eggs often appear to be of first quality when candled but can be bad within a few days. Practically all instances of black rot can be traced to the washing of dirty eggs.

Amber Whites.—The condition known as amber whites is characterised by a reddish brown discolouration of the white usually only noticed after eggs have been in cold storage for some time. On one occasion in Queensland this trouble was traced to the feeding of cottonseed meal. It can also be caused by feeding green feed containing plants belonging to the same family as cotton (*Malvaceae*).

Shell Ridges.—Many eggs are seen that are abnormal with regard to shell formation. One of these common faults is that of a ridge round the middle of the egg. Unfortunately the farmer can do little about these eggs as they are caused by an abnormal condition of the hen's oviduct at the time of laying.

Tremulous and Loose Air Cells.—Jarring or rough handling of eggs can result in rupture of the inner shell membrane with a resultant abnormal air cell. In extreme instances, the air cell may float freely in the egg or a number of air bubbles may be formed. It is obvious that eggs should be handled carefully.

Olive Yolks.—In some eggs when candled the yolk shows a greenish discolouration. This is referred to as an olive yolk. Certain types of green feed are thought to be responsible for this condition. Plants of the family *Malvaceae* and shepherd's purse (*Capsella bursa-pastoris*) have at times been considered the cause.

The Egg and You

The hen gives you the egg nicely wrapped and in a first grade condition. It is your job to see that the consumer gets this egg in good condition. This can be aided by careful management of the flock and hygienic handling practices. Breeders can help by culling those birds which do not lay first grade eggs.

Above all, a method of cooling eggs quickly and keeping them cool is needed to prevent them becoming heat-affected and stale. Charcoal coolers offer a cheap and effective method of achieving this. The use of such coolers will result in better returns to the farmer through better grading of eggs and a more stable market because the housewife will buy eggs with confidence.

◆

Putting a Check on Bloat

WHILE there is no certain method of preventing bloat, there are several management practices which help to reduce its severity and occurrence. You may be able to use one or more of these.

Bloat is most likely to occur in stock grazing pastures which contain over 50 per cent. clover or lucerne. Efforts to keep a balance between the grass and clover in a pasture are thus worthwhile but for short periods of the year it may be difficult to do this.

Hungry and empty stock are liable to bloat. The moral is—don't turn hungry stock into pastures likely to produce bloat. Give then some other feed beforehand.

Intensive grazing of small areas is also thought to reduce the likelihood of bloat. This can be done by means of strip-grazing, using an electric fence to keep the stock on a small area.

Mowing of the pasture half a day or so before grazing is another helpful practice. The cut material wilts before it is eaten and is then less likely to cause bloat.

The provision of some coarse hay, such as sudan grass or oaten hay, in a hay rack in or near the pasture being grazed, is useful.

Lately, promising results have resulted from spraying melted tallow plus a detergent on to pastures. Tallow is used at the rate of about 2 oz. for each cow.

See the Department of Agriculture and Stock if you want more details on this subject.

—*W. F. MAWSON,*
Senior Adviser in Cattle Husbandry.

Stock and Station

THE Agriculture Department wants to obtain more identical twin calves for use in nutrition and management studies at its research stations. In research, identical twins save the use of large numbers of unrelated animals. They have the same inheritance and, if managed and fed in the same way, they should, in theory, respond similarly. In studying certain characters, the response of identical twins is very efficient. It has been found, for example, that in studying growth rate, one pair of identical twins is as reliable as two groups of 13 ordinary calves.

The Department is offering £8 to £12 a calf, according to age, for healthy identical twins up to three months old. Farmers who wish to sell or donate twin calves they believe to be identical should consult the officers at their nearest Agriculture Department office.

—*W. F. MAWSON,*
Senior Adviser in Cattle Husbandry.

HOLLOW concrete floors are recommended for pig sheds. A great deal of sickness, which slows down growth, occurs among pigs every year because they are housed on cold, wet floors. Neither wooden nor solid concrete floors are the complete answer.

It has been shown conclusively that the hollow concrete floor greatly reduces losses caused in the first place by cold, damp floors. This floor is drier than all others and warmer, even without bedding. It's cheap to construct and is ideal for sow-and-litter and weaner pens. The easiest way to build a hollow concrete floor is to use empty bottles. Place them flat on a prepared site about one-inch apart. Fill the spaces between the bottles with concrete; then pour a layer of concrete, not more than three-quarters of an inch thick, over them.

—*T. ABELL.*
Senior Adviser in Pig Raising.

THE Poultry Section of the Department is at present making a colour film on egg quality. This film will be used to demonstrate to farmers how heat can cause their eggs to become stale very quickly. In the making of this film some stale eggs were required to be photographed. To provide these stale eggs, one dozen fresh eggs were put aside at room temperature for two weeks. At the end of this two week period, these eggs were broken out for photographing, and they were found to be very stale. There was little thick white remaining and so they spread over a wide area. The yolks were very flattened and broke easily. They were just the type of egg a housewife would complain about if she broke one into the frying pan, and yet they were only two weeks old.

There is much to be learnt from this little story. Many eggs could be two weeks old before they reach the housewife, if eggs are marketed only once a week. It also shows that cool storage facilities are necessary on farms for storing eggs prior to marketing especially in hot weather. Eggs are a perishable commodity and should be treated as such.

—*B. W. MOFFATT,*
Poultry Adviser.

FOWL ticks, found particularly in the drier inland areas, are common common on farms where small flocks of poultry are kept. The ticks not only worry the fowls, but can transmit fowl tick fever to the birds.

Fowl ticks can be controlled or even eradicated by the correct use of a 1 to 2 per cent. DDT spray in the fowlhouse. A strong jet is essential to penetrate cracks and crevices in the timber. Avoid using tar-oils as they not only fail to penetrate effectively, but prevent other sprays from doing so. Any rubbish and nearby trees should be removed. About four sprayings at fortnightly intervals are required to eradicate the ticks.

Immature ticks on the fowls can be killed by dusting any flea powder containing DDT, BHC, or derris onto the birds. One per cent. DDT in liquid form can also be used.

—*P. D. RANBY,*
Veterinary Officer.

Timely Tips for June

WHEN June comes along the calving season will start in the next month or two. Remember that calving will most certainly bring trouble to an odd cow. Watch the herd, and especially the heifers closely for difficulty in calving and retained membranes or breeding bag infection after calving.

Skilled veterinary treatment early in any of these conditions certainly is worthwhile, not only in saving the cow but in keeping her in production for the most profitable part of her lactation.

You'll probably have litters of pigs coming along to coincide with the expected flush of milk. Did you know that the most serious losses in young pigs occur between birth and weaning? The Department has some sound ideas on cutting down these losses. Talk them over with your nearest pig husbandry officer.

Sow's milk is not very rich in iron. Consequently anaemia is common in baby pigs. This is one of the causes of loss that can be easily rectified.

Once the possibility of June rains is past the clean, cool weather which follows is a good time to dehorn. There aren't many flies about then either. Dehorning is a good thing. Ask any farmer who has done his herd. Like a lot of other things though, it has to be done well to give best results.

Talk over the technique of dehorning with your nearest veterinary officer, and do it soon!

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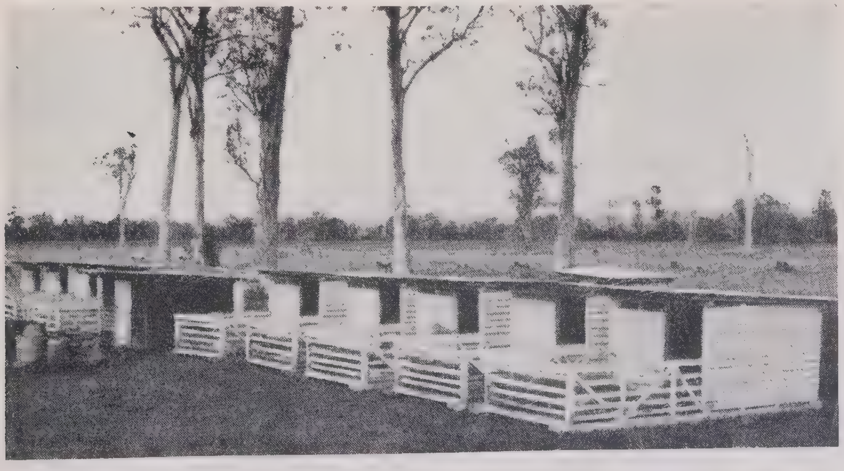

A C.E.S.G. grazing demonstration is in progress on Mr. I. Gulliford's Kilcoy farm, where these portable pig pens are shown. The sheds are concentrated while the pigs are being hand-fed, but they can be moved readily into grazing paddocks when required.

Windbreaks To Protect Your Crops

Contributed by
the Horticulture
Branch.

MOST of the cultivated crops grown in Queensland are susceptible to wind damage. The plant may be damaged by simple physical impact and/or the high or low temperature of the air at the time. If the "blow" occurs at a critical stage in the development of the crop, as, for example, when the fruit is setting or when it is nearing maturity, losses can be serious.

The more destructive winds in Queensland are:

(*a*) *Westerlies.*—In winter, these winds are very cold, and in summer they may be very hot and dry. Sometimes they blow at almost gale force. They can be a major problem to fruit and vegetable growers, particularly in southern and central Queensland.

(*b*) *South-easterlies.*—These are the trade winds of the coastal plains. They are generally mild and moist and persist for long periods, but in some areas near the coast they are sufficiently strong to cause root and leaf damage in tall crops such as bananas and papaws. Southerlies blow mainly during the March-November period.

(*c*) *Cyclonic winds* of variable direction, often of gale force and accompanied by heavy rain. They occur usually during the summer months when the ground has been soaked by rain and the root anchorage of cultivated crops is least stable. Crops in the path of these cyclones are often a total loss.

Wind protection is a necessity in almost all horticultural areas, but the measures to be taken on any particular property depend a great deal on the topography of the land, its aspect and the cropping programme. Windbreaks, therefore, play an important part in farm planning and though they may immobilise a certain amount of cultivable land, this is a small insurance premium to pay for safeguarding the rest of the property. In any case, well-laid-out windbreaks substantially improve the appearance of a farm.

Windbreaks are of various types:

(1) Blocks of natural timber may be left standing when the land is cleared.

(2) Suitable tree species may be planted closely in strips two or three tiers deep.

(3) The cultivated crop may be protected by closely planted strips of tall-growing herbaceous plants which may or may not be of commercial value themselves.

STANDING TIMBER

Where standing timber is retained, the windbreaks should be at least two chains wide in the case of rain forest and one chain wide in the case of open hardwood forest. Windbreaks of this kind are very apt to die out owing to the long-term effect of exposure and sometimes fire. They should, where possible, be fenced off from stock and bordered by ½-chain firebreaks which

Plate 1.

Athel Tree Windbreak in the Lockyer Valley from the Sheltered Side. The trees were close-planted in three rows, the outer rows being lopped to give an upward sweep to the westerly winds.

can be cultivated each year in early summer when the fire hazard approaches its peak.

TREE WINDBREAKS

Tree windbreaks may be planted to supplement or take the place of natural timber. They consist of narrow strips of quick-growing trees planted about at right angles to the more destructive winds. The protection given to any particular area depends on the density of the stand and the height of the trees; the denser the stand the more effective the protection, and the higher the stand, the greater the area protected on the lee side.

Complete protection usually extends for a distance equivalent to twice the height of the trees, but partial protection often extends much farther.

Tree windbreaks may comprise one or more species. Normally if a single species is used, it must have a dense base or be amenable to lopping which promotes the development of lateral growth near the ground. It is more usual, however, to plant the trees in two or three parallel rows with a spacing of 6–8 ft. between the plants in the row and also between the rows themselves. The outer tree row can then be lopped and the inner row allowed to develop naturally.

As far as possible, windbreaks should follow a natural line of demarcation between adjacent paddocks or cultivated areas and form a barrier in the direct path of destructive winds. If the obvious position for the windbreak is across a slope, gaps should be left in the stand to prevent any banking-up of cold air which might increase the risk of frost damage to the cultivated crop. Alternatively, the windbreak may be planted at an angle to the slope to permit the lateral flow of air on the upper side.

Where more than one species of tree is planted, each occupies an adjacent row in the windbreak, the taller facing the cultivated area and the smaller, usually more densely foliaged, species on the outside. When established, the canopy has an upward sweep on its outer edge, which is an advantage during periods of high winds.

Many trees are planted early in the wet season so that they will be well established before the following winter and thus be capable of withstanding stress conditions during the spring and early summer months. However, some pines do better in southern Queensland when planted in autumn.

Young trees should be protected from stock, weeded regularly for at least 12 months, and irrigated when necessary for at least two years after planting.

The more common windbreak trees grown in Queensland are loblolly pine (*Pinus taeda*), slash pine (*P. elliottii*), white cypress (*Callitris glauca*), Bribie Island cypress (*C. rhomboidea*), sand cypress (*C. columellaris*), Athel tree (*Tamarix aphylla*), lemon-scented gum (*Eucalyptus citriodora*), blue gum (*E. tereticornis*), tallow-wood (*E. microcorys*) and flooded gum (*E. grandis*).

TEMPORARY WINDBREAKS

Tree windbreaks occupy a considerable amount of land and only a limited number can be established conveniently on any property. They seldom provide all the wind protection required and it is customary, therefore, in some market garden districts to "box in" areas of low-growing annual crops with tall herbaceous perennial plants, such as sugar cane (usually cow cane) and some varieties of bananas (usually Lady Fingers or Ducasses). Cow cane breaks consist of two rows spaced 3 ft. apart; banana breaks are planted in two rows 4 ft. apart with 4 ft. between plants in the row.

Plate 2.

Cow Cane Windbreak Protecting a Crop of Tomatoes. In market gardening areas near the coast, this type of windbreak is very popular.

Plate 3.

Lemon-Scented Tea-Tree. A hardy shrub planted at the Redlands Experiment Station to protect the nursery.

The "box" break is seldom complete; usually only two sides of the cropping area from which the more destructive winds are expected, are established. Several such breaks may be planted on the one property and each can be renewed as required.

In upland or inland areas where tall, frost-susceptible perennial plants such as cow cane and banana cannot be grown, hardy shrubs may take their place. The more common species are privet, olive, tecoma and lemon-scented tea-tree.

Fertilizing Small Crops

Small crops need lots of plant foods; to keep them well-nourished you need to apply suitable fertilizers.

Recommended practice is first to apply a basal dressing of fertilizer 6 or 7 in. underneath—before planting—where the roots can get it as the plants grow.

This is the really important fertilizer application—it normally comprises about 75 per cent. of the crop's total requirements.

Trying to compensate for lack of basal fertilizer by applying very heavy side dressings is dangerous. When a complete fertilizer is applied to the surface soil, the phosphoric acid and potash seldom move downwards more than a couple of inches. The plants can utilise these foods when the roots approach the surface —but the trouble is: if the fertilizer is applied heavily, it may burn the roots and set back the plants.

A crop's total fertilizer requirements may be 15 cwt. to the acre or more. Imagine the dangerous concentration of salts if all this fertilizer is applied in heavy side dressings.

Later side dressing need only be light to feed the surface roots.

—D. DOWDLES,
Adviser in Horticulture.

Orchard and Garden

A NEW strawberry variety named Majestic is being tested by Agriculture Department officers at the Redlands Experiment Station. The variety was bred by Mr. E. Mazarz, of Palmwoods, about four years ago.

Mr. Mazarz considered that a strawberry yielding more and firmer fruit than the standard Phenomenal variety was required by the industry. He crossed Phenomenal with Mitchell's Seedling, a local type, and was able to raise a few crossbred seedlings. Some of these were unusually vigorous, and the best of them have been propagated for some years. The fruit is larger, firmer and a darker red than that of the Phenomenal. It promises to be a first-class berry for the fresh fruit trade and suitable for processing as well.

The trials at Redlands are aimed at assessing the vigour and disease resistance of the plant, and the flavour, colour and evenness of ripening of the fruit.

—*K. KING,*
Senior Adviser in Horticulture.

MANGO plants are very easy to raise from seed if the proper technique is adopted, but the wrong methods will result in many failures.

The seed should have the outer fibrous husk removed, which is most simply done by cutting round the convex edge with secateurs and peeling it off. A parchment-like envelope under the husk should also be removed. The seed can then be examined for soundness—those showing weevil infestation should be discarded.

The seed should be germinated in a fairly coarse sharp sand. If only a few plants are to be grown, this can be placed in containers such as cleaned-out gallon paint tins with drainage holes in the bottom. Two or three seeds can be placed in each tin. The seeds should be stood on the concave edge and pressed into the sand until only about one third of the seed is left exposed. Now cover the whole top of the tin with a layer of dead leaves or woodwool and set it in a partially shaded situation. Water every day to keep the sand moist. Germination will commence in 8 to 14 days.

—*S. E. STEPHENS,*
Horticulturist.

ARE you planning to plant pineapple suckers next autumn and spring? If so, it will be worth your while to see that your plants maintain their growth and vigour until planted. Don't make the mistake of letting the plantation go without fertilizer or attention after harvesting your crop.

Suckers which are starved in the field or overgrown with grass don't make good planting material. Certainly, they will grow. But it takes time and money to make weak plants into healthy ones. There is considerably more profit in growing a quicker, better crop by planting strong, healthy plants to begin with. This principle, of course, applies to other crops too.

The vigour of suckers in an old pineapple plantation can be maintained by supplying sulphate of ammonia. For the cost of a few bags of this fertilizer several thousand good, strong suckers can be secured from the old plants.

It is advisable to keep the plantation reasonably free of weeds. Otherwise, the competition may weaken the pineapple plants.

Plant your suckers while still fresh, soon after removal from the plants. But first give them time for the base to dry out to prevent base rot. This practice is generally called "curing". The best way is to lay them out on top of the rows after pulling. One or two days in the hot sun will "cure" them. Unnecessary delay in planting will result in leaf withering and consequent loss of plant vigour.

When planting, avoid cutting the leaves. Trimming may make the plants easier to handle, but it definitely gives them a severe setback.

Pineapple plants will live a long time out of the ground and will grow even after harsh treatment. Even so, for the best returns, you need to plant the best plants and see that they don't get unnecessary checks.

—*L. J. MISSINGHAM,*
Adviser in Horticulture.

* * *

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The Farm Family

Hints on Hacksaws

By C. G. WRAGGE,
Agricultural Engineer,
Adapted from an article
in "Practical Power Farming."

The hacksaw is a tool to be found in any farm workshop. In spite of this, it is a tool that appears to be the least understood and the most abused. When hand hacksaw blades break frequently, or their teeth become blunted quickly, it is usually because the wrong blade has been chosen or it is being used incorrectly.

When replacement blades are to be purchased, the man at the shop counter will probably ask you whether you require a 10 in. or a 12 in. blade. Perhaps the reason for this is that he has become accustomed to the customer's frequent reply "Oh! any old blade will do". There is, of course, the possibility that he is no wiser than you are on the type of blades best suited to your particular requirements.

For any job, the correct blade should be chosen according to the material and pitch of the teeth. This will ensure long life, faster cutting and lower blade costs.

The salesman is perfectly correct in asking you the length of blade required because they are obtainable in the two lengths. This nominal length is the distance between the pin holes used for holding the blade in the saw frame.

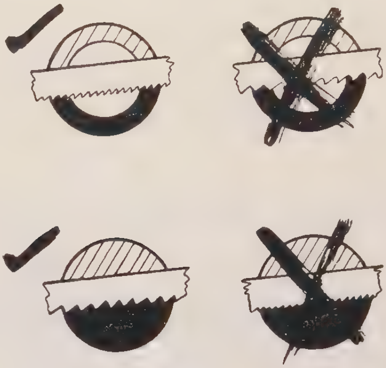

Plate 1.

Top: Use a Fine Tooth Hacksaw when Cutting a Tube, So That at Least Two Teeth of the Blade Make Contact With Each Cutting Area. Coarse teeth straddle the work and may strip. Bottom: Use a coarse tooth hacksaw blade for cutting thick sections because they leave ample chip clearance and allow smooth, easy operation. Fine teeth may clog.

Blade Types

Blade types are as follow:—

(1) TUNGSTEN STEEL, (hard all over).—This type of blade is suitable for general sawing work of fairly soft metals. It will not stand up to abuse, but in the hands of a skilled user will do good work. It is low in price.

(2) TUNGSTEN STEEL, (spring temper).—A fully hardened blade on the tooth edge but with the rest of the blade spring-tempered for elas-

ticity. This blade will revert to its original shape after bending. It withstands a considerable amount of rough treatment and is recommended for use by those unskilled in the art of using a hacksaw.

(3) TUNGSTEN STEEL, (soft back).—This type of blade is hardened on the teeth edge only but has a completely soft back which permits the blade to be bent and twisted and is useful for sawing in awkward positions.

(4) HIGH SPEED STEEL (all hard).—This type of blade is the most expensive and has displaced the tungsten steel type in most engineering shops. Although relatively high in first cost, it is nevertheless an economical proposition in the hands of a skilled user because of its long life and ability to cut almost any material while at the same time maintaining tooth sharpness.

Tooth Pitch

Correct tooth pitch is governed by the hardness of the material to be cut and its shape.

For thick sections it is advisable to use a coarse tooth which will provide chip clearance. The use of a fine tooth is liable to cause clogging.

The fine pitch tooth is recommended for thin sections such as tubing and sheeting which would tend to strip off coarse teeth.

Tooth pitches and the type of work they are best suited for are as follow:

14 teeth per inch (t.p.i.): For cutting stock over 1 in. wide. For soft material of thick section so as to give a maximum chip clearance.

18 t.p.i.: A general purpose blade for use when one blade is to be used for many different jobs.

24 t.p.i.: Pipe sections between 1/16 in. and ¼ in. thick; small structural sections and small diameter rods.

32 t.p.i.: For material up to 1/16 in. thick such as thin-walled tubing, sheet metal and thin plastics.

The general rule when selecting a blade tooth pitch is to be sure that at least two teeth will be in contact with the work at any blade position.

Correct Use

To get the best performance out of a blade it must be of the correct type for the job and it must be used correctly.

The blade must be mounted in a rigid frame and the mounting pins must be in good order. The teeth of the blade should point forward, away from the handle. Tooth direction of a fine-toothed blade can be checked by running the thumb nail lightly over the teeth in both directions.

When using the hacksaw, the blade should be pushed firmly at a slight angle on the forward stroke as illustrated, so that the teeth are made to bite the metal. The pressure is relaxed on the return or backward stroke. It is important that the teeth should not be allowed to slide over the metal without cutting, as this will burr over the tips and blunt them.

The maximum sawing speed should be 60 strokes per minute. This speed can be reduced to 40 strokes per minute when sawing thick sections. At slow speeds, a much heavier pressure can be applied on the forward stroke.

The Good Chairman Is Fair And Impartial

By J. PARK,
State Organiser,
Queensland Junior Farmers' Organisation.

THE chairman must act fairly and impartially at all times and make certain that all have an equal chance of voicing their opinions as long as they observe the rules of debate. The chairman will no doubt have his own views on the matter under discussion, and he may express them, but he must not use his position to exert an undue influence over the members.

If the chairman wants to take part in a debate on a controversial matter, and to speak at length and with force on the subject, he should ask another member (the deputy club leader, if present) to take the chair. Having left or vacated the chair, he becomes an ordinary member of the meeting, and as such is subject to the ruling of, and must obey, the acting chairman.

Closing the debate

The chairman closes the debate when all members wishing to do so have spoken, or when he feels that the matter has been discussed long enough for the meeting to come to a reasonable decision.

Strictly speaking each member is permitted to speak only once on any motion; the permission of the chairman must be sought before a second speech is permitted.

The mover of the motion, or the proposer, is permitted the "right of reply", and once this right has been exercised, the debate is closed, and the motion is put to the vote. In speaking a second time, the mover must not introduce any new matter or arguments, but must keep to the same line he adopted when moving the resolution.

The seconder of a resolution may, with the chairman's consent, merely second the motion formally, and reserve until later in the debate his right to speak. He may also second a motion "pro forma", and decline to speak for the motion. The chairman may give warning towards the end of a long debate that he proposes to close it in a few minutes' time. A debate can also be closed by the meeting passing a properly moved and seconded motion "that the question be now put" or "that the debate be closed and a vote taken".

If any member thinks that one of the rules of debate or procedure is being broken, he can rise to his feet and say "Mr. Chairman, a point of order———." The speaker must resume his seat, and the chairman must consider the objection raised.

The chairman's ruling as to whether the point of order is taken or not is final, and cannot be discussed.

Amendments

An amendment is a resolution to add words to or subtract words from a motion already being discussed. Thus if the motion is "That a field day be conducted," and if there are members present who want to make certain that it is held during May, then an amendment might be proposed "that the words—in May this year—be added."

This amendment, or any other amendment, when it has been properly moved and seconded, must be put to the vote first, before the original motion, and those who are still in favour of the original must vote against the amendment.

If the amendment is carried, it becomes the motion, and as the motion it is open for further debate and further amendment if necessary.

An amendment must not be a direct negative to the motion. The chairman should not accept more than one amendment to a motion at a time. A member may indicate that he does not approve of the present amendment by foreshadowing another. By doing so, he will indicate the substance of his proposed alteration, and members can vote on the amendment before the meeting in the light of these proposals.

It should be remembered that voting on an amendment means making a choice between the resolution and the amendment. Whichever one wins must be voted on again, and the choice then is between the resolution (new or old) or doing nothing.

Sometimes the mover and seconder of a motion, or amendment, may wish to withdraw it before it has been voted on, having had their minds changed, perhaps, by some new thought introduced during the debate, or by some thing said by the chairman. A request from these two has to meet with the approval of the whole meeting before a withdrawal is permitted.

Voting

When a resolution (motion) is "put to the meeting" (voted upon) after full discussion has been allowed, the chairman must make sure that all understand the choice that is before them. If there is any possibility of confusion he should insist that the motion be read slowly and clearly. He can then say "You have all heard the resolution which has been moved and seconded. Will those in favour please vote? . . . those against? . . ."

Voting on such a motion is by show of hands, and it is the duty of the chairman to announce the result by saying "The motion is carried" or "The motion is defeated." The result is *unanimous* when everyone entitled to vote does so, and all the same way.

A resolution is carried by a *majority* when some members vote for it and a smaller number against it.

A member may *abstain from voting* if he so desires, and may ask the secretary to record the fact. The number voting on each side should be recorded in the minutes when the matter is of some importance, or when the number is almost equal.

The chairman has the same right as any other member to a vote, but he should think twice before he exercises that right, let him be sure that all the relevant facts for and against the matter have been clearly presented, and that the issues at stake are understood, then he can sit back and let voting take its course. Should the chairman vote and the result be a tie, he may make a second vote if he wants to.

This second vote is called the chairman's *casting vote*. (Not all constitutions permit the chairman to have a casting vote). Should the result of voting be a tie, and the chairman decide not to use his casting vote, the status quo remains and the matter must be laid aside, and cannot be dealt with again at that meeting. It is a wise chairman who declines to use his casting vote on some resolution which is controversial, or on some issue which will change the "old" order of things.

Hints for Club Members

YOU will now have had a chance to find out how your club programme for the year is going. Have a frank discussion about it in the club, and make any necessary alterations. A programme, to be effective, must be elastic and allow of changes being made. Make this check on the programme a quarterly one.

The club's show exhibit will be exercising the minds of many members now. A few thoughts from outside the club might help. The exhibit should aim to emphasise one main idea. Present only striking material that will catch and hold attention and perhaps cause the viewers to think. Don't "fill up" the exhibit with masses of vegetables, fruit, grains and placards; the result may be confusing rather than enlightening. It is better to use fewer, attractive and well-spaced items than overcrowd your precious space.

Queensland Bush Book Club

The Queensland Bush Book Club will supply literature to anyone living beyond the reach of a town library.

For a subscription of 3s. 6d. a year, members may receive parcels consisting of 10 books, mainly fiction, and some magazines and illustrated papers.

Parcels will be consigned to a member free of cost to the nearest railway station but the member will make his or her own arrangements for delivery from and to that station.

Each parcel contains about three months' reading, but will be exchanged to meet all reasonable requirements of members. Owing to method of distribution of parcels, choice of particular books by members is impracticable.

Write to Secretary, Bush Book Club, Victory Chambers, Adelaide Street, Brisbane, enclosing 3s. 6d. and you will be enrolled as a member.

If living north of St. Lawrence, write to Bush Book Club, Box 475 G.P.O., Townsville, and if in the Brisbane Valley to Bush Book Club, Ipswich.

Plate 1: Fordson Diesel Mounted wit Front-End Loader.

Mulga At Less Than 2d. A Week

By R. J. ANSON,
Adviser in Sheep and Wool.

Costs working out at 1.7d. per sheep per week highlight mulga pushing as a most economical method of feeding sheep during drought.

PUSHING mulga with front-end loaders, four men fed and kept alive 24,500 sheep and 350 cattle through a year-long drought—and the weekly cost was only 1.7d. per sheep.

Messrs. N. and R. Watts, with two helpers, were forced to mulga-feed on their 289 sq. m. property, " Tinderry," which lies 100 m. south-west of Quilpie, in Queensland.

They began to push mulga in February, 1958, and were still pushing in January, 1959. Rainfall at " Tinderry " in 1958 was 585 points, in 16 falls. However, where mulga was pushed, less than 2 in. fell during 1958.

On the red brown soils and low, stony rises of the Grey Range west of Quilpie, mulga (*Acacia aneura*) is the principal standby for drought feeding. From the axe to the bulldozer various methods have been used to put mulga in front of stock.

At " Tinderry " they pushed it down with tractors equipped with front-end loaders.

These machines have dealt effectively with umbrella mulga and tall mulga and they worked well in dense scrubs.

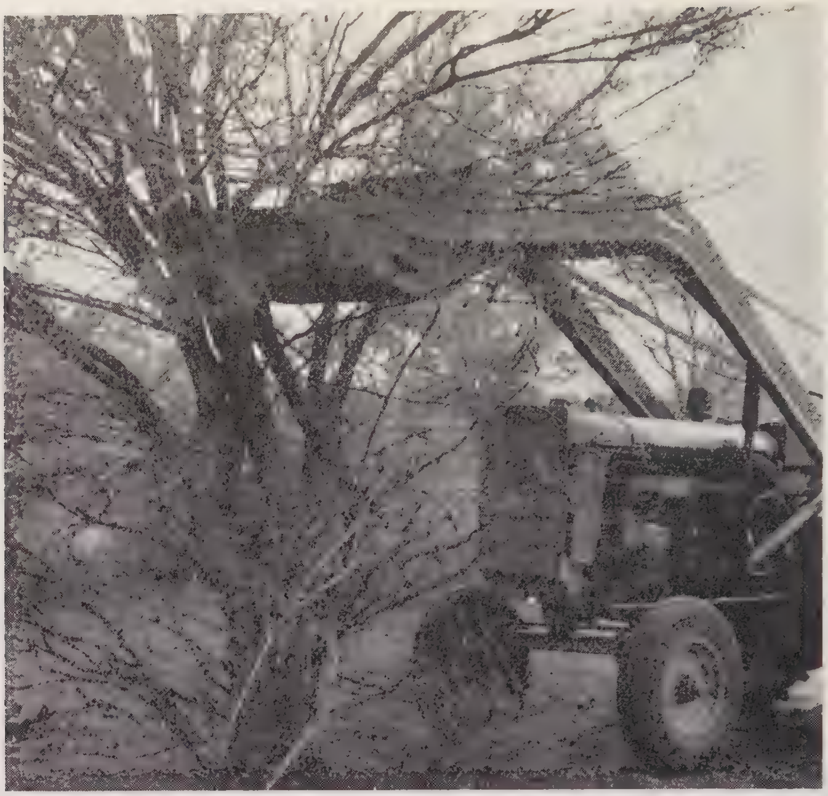

Plate 2.

Front-End Loader at Point of Impact, Showing Guard Plate for Radiator.

In umbrella mulga they were used to knock out the branches in such a way that the trees continued to grow, that is, they knocked out the leaders without damaging the laterals.* The branches were scattered so that sheep had ready access to the foliage and did not become entangled in the fallen branches.

Trees carrying mistletoe were pushed right down and crushed to kill the parasite. Any sharp sticks or old stumps which appeared likely to damage the tractor tyres were swept away with the front-end loader before it was lifted to push the trees.

Machinery Used

Several good, second-hand tractors, all of the rubber wheel type, were purchased at the commencement of feeding.

Types and costs were:—

Tractor.	Fuel Type.	Power.	Cost.
		B. H. P.	£
Ferguson	Kerosene	28·4	425
David Brown	Kerosene	27·5	300
Fordson	Diesel Distillate	41·0	350
Fordson	Kerosene	32·5	275
4 Front end-loaders, new	..	..	1,175
			£2,525

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* See article "Feeding Sheep on Mulga," Q.A.J. June, 1958.

Taking into account only the 24,500 sheep, this cost works out at approximately 1.2d. per sheep per week.

Calphos ration at 10 bags per 24,500 sheep is equivalent to ⅜ oz. per head per week.

With long-term mulga feeding, it is advisable to give a Calphos ration of 2 oz. per head per week to fulfil phosphorus requirements as was done later at "Tinderry."

This would raise requirements to 31 bags of bone flour per week, and add £42 to the costs shown.

The result would mean raising the cost per head per week to 1.6d., which is very economical.

However, this does not take into account interest on capital expended, and depreciation of plant. These items could be estimated at 20 per cent. on £2,525, plus interest on capital expenditure at 6 per cent. making a total of approximately £650. This is equal to £12 10s. per week, or equivalent to adding .125d. per week to the cost of 1.6d. per head per week.

Plate 3.

Mulga Tree in Process of Being Broken; and Leaders Being Pushed Out, Leaving Lower Laterals Intact.

Plate 4.

Regrowth from Laterals After Pushing.

Breakages were negligible, and the only replacements required were two front and two rear tractor tyres.

Stock Losses

Of the 24,500 sheep and 350 cattle fed, losses throughout were negligible.

Weekly Costs

	£	*s.*	*d.*	£	*s.*	*d.*
Labour—						
Wages, 4 men	56	0	0			
Keep, 4 men	20	0	0			
				76	0	0
Supplementary Lick—						
10 bags Bone Flour (Calphos)	20	0	0			
5 bags Coarse Salt	4	10	9			
				24	10	9
Fuels, oils, for tractors—						
66 gal. power kerosene at 4s. 3d. gal.	14	0	6			
16 gal. petrol at 4s. 8d. gal.	3	14	8			
27 gal. distillate at 3s. 11½d. gal.	5	6	11			
4 gal. oil	2	14	0			
				25	16	1
Total Weekly Cost				£126	6	10

Weed Risk Seen in Sorghum Almum

Sale of sorghum almum seed in Queensland is still prohibited, and for several good reasons, the Minister for Agriculture and Stock (Hon. O. O. Madsen, M.L.A.) said recently.

He said Agriculture Department officers feared that sowings of this plant could create a troublesome and costly weed situation. They urged caution until it had been tested thoroughly under Queensland conditions.

Sorghum almum seed cannot be readily distinguished from Johnson grass seed—and Johnson grass is a very serious weed pest in cultivated land. One of the parents of sorghum almum is known to be Johnson grass.

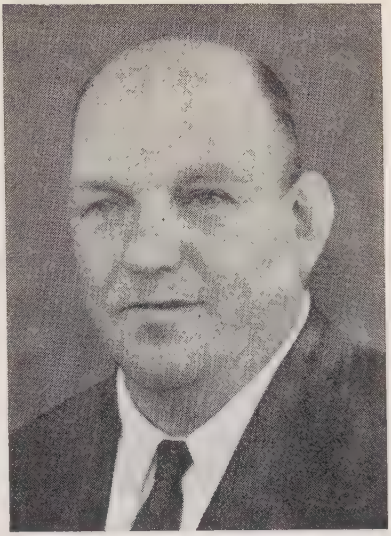
It would appear that sorghum almum is no more dangerous to graze than Sudan grass and the well-known grain sorghums and sweet sorghums. But the risk is there, and it is a very real one where uncontrolled grazing methods are employed.

Sorghum almum comprises a mixture of strains, and some of these strains can cross with Johnson grass. Because of this, there is a chance that, if fields of sorghum almum are sown in the vicinity of Johnson grass, many types of plants closely resembling Johnson grass in habit could develop in the stands of sorghum almum.

Further Investigation

Sorghum almum is not a perennial in the sense that it will be a permanent pasture for many years as would be the case, for example, with Rhodes or buffel grasses. Whether sorghum almum can be grown in combination with a legume to provide the basis of a permanent pasture needs further investigation. Evidence suggests that there has been some success in this direction.

As far as is known at present, sorghum almum appears to do best on the more fertile soils. But even on these soils, periodic ploughing and rotation of the land with other crops would be necessary to maintain the level of fertility required for the good growth of sorghum almum.


Hon. O. O. MADSEN, M.L.A.

There is the risk that the normal rotation programme could be prejudiced by having to combat Johnson grass or plants of very similar habit introduced as a result of the previous sowing of sorghum almum.

It is understood that some thousands of acres of sorghum almum have been sown with seed obtained in various ways. Before further sowings are made, however, the risks should be carefully weighed, said Mr. Madsen.

Annual crops of Sudan grass for summer grazing and oats for winter grazing offer a safe approach for graziers who are adopting the very desirable practice of using grazing crops on cultivated land for better livestock feeding.

Research on sorghum almum is being continued by the C.S.I.R.O. and other organisations. Departmental officers will keep in touch with developments to determine whether any change is warranted in the Department's attitude on this species.

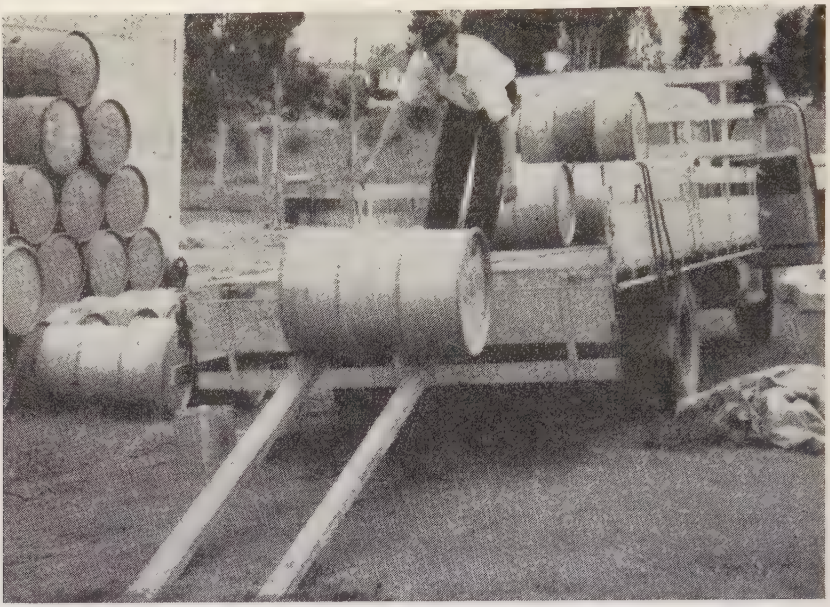


Plate 1: Honey in 44-Gallon Drums Being Unloaded at a Brisbane Honey Packing Factory.

Honey in 44-gallon Drums

By C. ROFF
Adviser in Apiculture.

QUEENSLAND beekeepers are taking an interest in marketing bulk honey in 16-gauge, 44-gallon, galvanised steel drums, and already several have stopped using 4-gallon cans.

Use of the larger containers has the following advantages:—

1. Time is saved both in the field and the packing house, and consequently handling costs are reduced.

2. The 44-gallon drums are returnable to the beekeeper and may be used indefinitely, while 4-gallon cans have only limited re-use value. The initial cost of £5 17s. for the large container against 5s. 3d. for a 4-gallon can is quickly recovered.

3. The drums, either empty or full, may be stacked unprotected in the open. Four-gallon cans, which rust easily, must be stored in a shed or under tarpaulins.

In the beginning, beekeepers may encounter difficulties in handling drums, but as in other industries, these have been overcome by experience. Drums may be filled on the truck, and will need to be marketed immediately to release the vehicle for other purposes. Particular care should be taken when loading from the ground with hardwood skids, as a full drum of honey weighs about 725 lb., and a slip could result in serious injury. A suitable ramp or loading platform is desirable where these heavy containers are handled constantly.

Drums should be marked clearly at all times with the owner's name and address, and the tare. Empty drums vary from 76 to 82 lb.

Stock and Station

DRENCHING alone will not give good worm control in calves and weaners. It should be coupled with rotational grazing so that newly drenched stock can be put into spelled paddocks.

Drenches confer no immunity on the animals. They only kill the adult worms inside the beast. When drenched stock are put back in the same paddock, they immediately start to pick up a fresh burden of young worms from the contaminated pasture. In a week or so they will be carrying just as many worms as they were before treatment.

For worm control measures to be effective, subdivision is essential. At least one paddock should always be unstocked to starve out the worm larvae. Then spelled pasture is always ready for drenched stock. In this way, you'll get full value for the cost and labour of drenching.

—K. M. GRANT,
Assistant Director of Veterinary Services.

IT'S dangerous to dip cattle in arsenic when they're hot or excited, or in rainy weather. Furthermore, don't excite them or drive them immediately after dipping.

Cattle may still sometimes scald, even when these precautions have been taken and when a dipside test has given a normal reading of eight. This is because some types of bacteria act on the arsenic compound in the dip, changing it into another form. In this form, it isn't detected by the dipside test and it isn't very effective in killing ticks.

For this reason, each year you should send a thoroughly stirred sample of your dip to the Animal Research Institute, Yeerongpilly, for testing. If tests show your dip isn't efficient, you'll be told how to correct it.

—S. G. KNOTT,
Divisional Veterinary Officer.

PIGLETS are normally weaned at eight weeks, but attention is now being given to earlier weaning. In many places it's becoming common to wean litters at 10 days or 4 weeks. Trials in Queensland have shown that weaning at 10 days would not be successful on the average farm. But good farmers could wean their litters at 4 weeks.

To obtain satisfactory growth in litters weaned at 4 weeks, the piglets must be housed in a shed with a warm, dry floor and free from draughts. The food must be palatable and readily available, and rich in energy and protein. If you want to try early weaning, start with 6-week-old pigs, and as you gain experience gradually reduce the age of weaning. In this way, you're less likely to have serious failures.

—F. BOSTOCK,
Senior Pig Husbandry Officer.

BLACKHEAD is caused by a minute parasite which attacks the blind-gut or caeca of turkeys. Fowls commonly carry the parasite but are rarely affected. In turkeys, the parasite usually enters the liver from the blind-gut, causing pale yellowish areas up to the size of 3d. These are characteristic. Death rates of more than 50 per cent. are common in turkey poults.

For the blackhead parasite to complete its life-cycle, it requires the presence of the caecal worm. It enters the caecal worm eggs where it is protected.

Prevention is the rule for blackhead. Reduce ground contamination by removing caecal worms from older birds (both turkeys and fowls) before the youngsters arrive. This may be done cheaply by supplying phenothiazine in the mash for two days.

For the young poults, supply Enheptin-T in their mash or drinking water for the first 8 to 12 weeks of life. This drug can also be used for treating affected poults but is much more effective as a preventive.

Range the turkeys as much as possible. Do not rear young turkeys near older birds. If many turkeys are raised, it is better not to keep fowls at all.

—*P. D. RANBY,*
Veterinary Officer.

TODAY the modern trend is towards intensive methods of poultry farming and the use of "high energy" rations which are based largely on crushed grains. It has been noted that under intensive methods of management, and with the use of high energy mashes, feather picking and cannibalism may become prevalent.

This can be prevented by debeaking, which is the removal of part of the upper beak. Debeaking also reduces food wastage and the birds can't effectively "pick over" the feed.

Debeaking can be performed with an electric debeaker. We have found from our experiments that best results will be obtained when debeaking is carried out on three-day to week-old chicks. Only half of the top beak should be removed, and the end of the seared beak should be properly cauterized to stop bleeding.

Debeaking, although generally practised at chicken stage, should be a valuable means of combating cannibalism if the condition happened to appear in older fowls. Debeaking is easy, successful and money saving. Ask your district poultry officer for full information.

—*K. D. PUGH,*
Assistant Adviser, Poultry Branch.

Timely Tips for July

WITH the cows starting to calve this month or in the near future, what about herd recording? Things are getting tighter all round so anything that helps you farm more profitably is good. Herd recording has something for you. See your local dairy officer about it.

Worms can do young pigs a lot of harm without a farmer really knowing about it. Make up your mind to find out how your pigs stand for worms. Mention it to your veterinary officer and he will drop in next time he is out your way. If worms are active he'll give you details of modern treatments which are safe and simple.

A lot of infectious diseases flare up in pigs shortly after weaning. Probably the pigs are more prone to infection then because of the change in diet. Watch them closely at this time. If you see any symptoms, check a few pigs' temperatures and, if there is any rise, discuss it with your vet.

Every farmer should have a thermometer and be able to read it. It tells a lot about ailments of all animals.

After calving, cases of milk fever and grass tetany may be seen in your cows. Watch for any peculiarities of gait, excitement, and paralysis at this time. Both of these conditions can be treated with injections (different in each case).

If you inject any drug into your animals make sure you know how to do it properly. An injection that is not cleanly done can be as serious as the disease it was meant to treat.

How many fowls should a dairy farmer keep?

By B. W. MOFFATT, Adviser,
and R. V. BYRNES, Assistant Adviser,
Poultry Section.

Keeping about 25 hens for egg production on the dairy farm is quite practical and economic if the right methods are followed.

One of the advantages of living on a farm is that the household bills can be reduced by producing a variety of food—for example, vegetables from a good vegetable patch and eggs from a small flock of fowls. On most dairy farms can be found a flock of fowls of one sort or another quartered in, under, and around barns and sheds. The efficiency of production of these flocks is questionable. Often they have bred indiscriminately for generations as is shown by their multicoloured plumage derived from two or more breeds.

It is quite often the case that although up to 50 or more fowls are on the farm, eggs are in short supply. The fowls often have to find their own feed and consequently their egg production may be below 100 eggs a year. A few well-cared-for fowls should have little trouble in supplying eggs for the farm household throughout the year. The outlay involved in a small poultry shed should be more than offset by the ready supply of fresh eggs at most times, and a reduction in the household food bill.

How big should the dairy farm flock be? If 25 layers were fed properly and housed in a good shed they could be expected to produce an average of seven dozen eggs a week. This would be more than sufficient for the average farm household.

If only a small number of good hens are to be kept, then it is essential that these be replaced every year or at least every second year. It is now a well-known fact that many birds will lay 200 eggs in their first year, but they may only lay 120-140 in their second year. In addition to this, after their first year's lay, most birds will moult for a period up to three months.

If these birds are not replaced at the end of their first year, eggs are likely to be in short supply in the winter months while the birds are moulting. For these reasons then, it is suggested that the layers be culled heavily from September onwards and replacement chicks purchased in August or early September. As these birds will start laying in January or

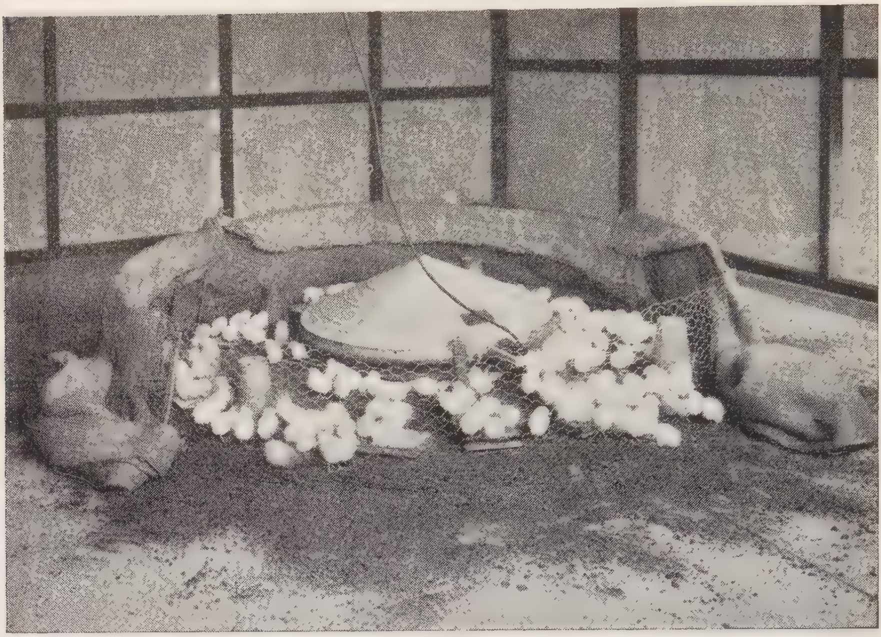


Plate 1.

An Electric Hover Type Brooder with Thermostatic Control. When chickens are first placed under the brooder, they should be confined to within 1 ft. of the outside edge and their range increased from day to day.

February, all the old hens should be killed off before the beginning of March.

Replacements are best obtained as day-old chicks. Started stock, at least a month old, are often purchased for replacements, but with this class of stock, there is a much bigger risk of bringing disease onto the farm. The day-old chicks can be purchased as pullets or as unsexed chickens depending on whether cockerels are required for table purposes. If unsexed chicks are obtained, the cockerels should be separated from the pullets as soon as possible to avoid bullying.

For egg production "crossbred" pullets may be preferable, as experiments have shown that these usually lay more eggs than "purebreds." Chickens should be obtained from a Government-registered hatchery. If 25 laying birds are eventually required it would be wise to purchase 30-40 day-old pullets or 60-80 unsexed chickens to allow for rearing losses and culling. It must be remembered that if 50 or more head of poultry are kept on a farm within an egg board area, then this flock must be registered with that board.

Look After Young Chicks

Chickens need special attention during the first three weeks of their life. They must be kept warm by means of a brooder and protected from rats, hawks and other killers. Brooders are available which are suited to rearing small numbers of chicks. Electric brooders are the easiest to operate, but where electricity is unavailable, kerosene brooders prove very satisfactory. The initial brooding temperature is 95 deg. and is reduced gradually as the chickens become older. By three weeks of age, the chickens should need no further heat, provided they are kept in a reasonable shed free from direct draughts. The behaviour of the chickens will indicate whether the temperature in the brooder is too high or too low. If the chicks are too widely spread under the brooder at night, the temperature is too high. If they are huddled under the brooder, then it is obvious that the temperature is not high enough. With a little experience, it is not difficult to tell when the chickens are comfortable and the temperature is right. Small electric brooders do not usually have a thermostatic control so the temperature has to be controlled by raising or lowering the brooder, which either lowers or raises the temperature in the vicinity of the chickens.

When the chicks are about four weeks old they can be allowed to run out provided weather conditions are not too severe. It is, however, essential to protect them from predators such as hawks, crows, kookaburras and rats.

As pullets will commence to lay at about five months, it would be wise to have them settled in the laying quarters at four months.

Home Comforts

The intensive method of housing has a number of advantages over the semi-intensive or house and yard system. Weather conditions have very little effect on the birds; predators such as foxes cannot take toll of the flock; manure can be easily collected

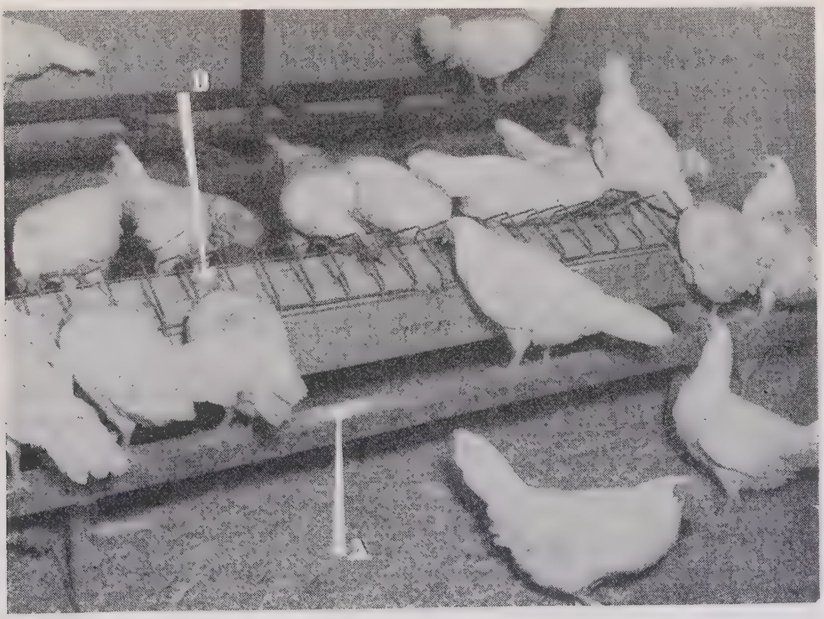


Plate 2.

Pullets Feeding From a Recommended Type Feed Hopper which Has Been Overfilled to Show the Feed Wastage which Results. This photograph was taken 10 min. after the trough had been filled to the brim and the mash levelled off. Spilled mash is already visible on the alighting perch of the hopper (A). Mash is being raked out at (B).

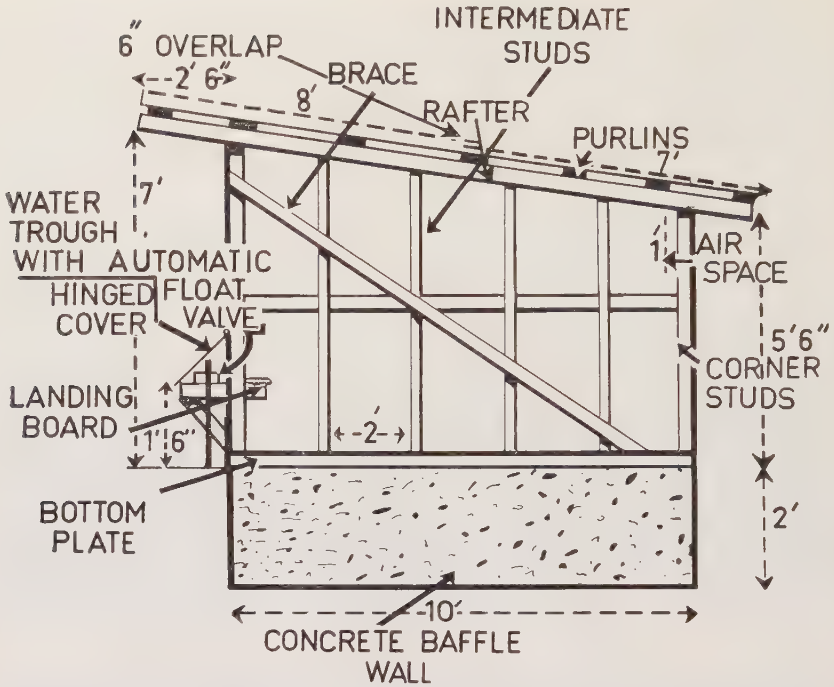

6" OVERLAP
2' 6"
BRACE
8'
INTERMEDIATE STUDS
RAFTER
PURLINS
7'
WATER TROUGH WITH AUTOMATIC FLOAT VALVE
7'
HINGED COVER
LANDING BOARD
1'6"
1'
AIR SPACE
5'6"
CORNER STUDS
2'
BOTTOM PLATE
2'
10'
CONCRETE BAFFLE WALL

Plate 3.

Side Elevation of an Intensive House to Accommodate 25 Birds.

and used for a vegetable garden; parasites can be effectively controlled; and during wet weather the eggs produced are much cleaner. With this type of housing, a minimum of 4 sq. ft. of floor space should be allowed for each bird. If 25 birds are to be kept then a shed 10 ft. x 10 ft. would be sufficient to house them. This shed should preferably have a cement floor. Ventilation and coolness must be considered and for these reasons the front of the shed should be covered by wire netting and some ventilation allowed in the back of the shed. If the shed is constructed of iron it can be painted silver on the outside to reduce the inside temperature in the summer months.

The floor of the shed should always be covered with at least 4 in. of litter such as sawdust or shavings. It need not be cleaned out unless the litter becomes wet or too deep, but it is wise to clean the shed before new pullets are housed.

Nests should be provided in the pen at the rate of one nest to every five birds. These nests should preferably be cool and dark and no more than 2 ft. from the floor. A good depth of nesting material should always be kept in the nest boxes to prevent breakages. Pine sawdust or shavings are very good for this purpose.

Perches 18 in. to 2 ft. from the ground made of sawn timber such as 3 in. x 1½ in. should be provided for the birds. Allow at least 6 in. of perching space for each bird.

A feed hopper for mash allowing 8 linear feet of feeding space would be required for 25 birds. Where a reliable water supply is available, an automatic watering trough, such as the float valve type, is ideal. This is best situated on the outside of the wall of the pen, and the birds allowed access to it through a wire grill. If ordinary water troughs have to be used, they should also be placed on the outside wall of the pen, so that the litter does not become wet around the water trough. As cool water is always desirable, the trough should be shaded from the sun.

Correct Feeding Important

As most dairy farmers would not be likely to mix their own mash for a small number of birds, the purchase of prepared mashes is suggested.

Chickens are fed on a chicken starter mash from day-old to eight weeks of age. From eight weeks to laying stage, a growing mash is fed.

When the birds commence to lay, they are fed either an "all mash" laying mash or a laying mash with grain, in the afternoons. When purchasing these feeds, it is a wise precaution to stipulate that they contain vitamins A and D3. When feeding mashes with vitamins added, it is not essential to feed green feed. However, if fresh green feed is available, it can be fed to advantage at the rate of 1 lb. a day to every 20 birds.

Shell grit should be provided at all times to supply calcium. Fine shell grit will be needed for the chickens. Where birds are housed intensively or where the soil contains very little insoluble grit (small stones), a small amount of this grit should be placed in the pen from time to time. Creek gravel is suitable for this purpose.

There is no truth in the statement that fowls can be overfed. Restricted feeding results in reduced egg production. Mashes are a main cost item, so to prevent wastage feed hoppers should not be filled more than half full.

Don't Keep Loafers

Any birds that are obviously not paying their way should be used for the table immediately, as they still eat their share of the mash.

If production in the pen is not sufficiently high, all the birds can be handled so that the poorer producers are removed. The poor producers are detected by a small dry vent, with less than two fingers' distance between the pubic bones and less than a hand's breadth between the pubic bones and the breast bone. These poorer producers often have the best looking plumage, either because they moult frequently or do not get their feathers worn from visiting the nest.

Any bird showing signs of disease should obviously be removed as a cull.

Disease Prevention

Where birds are kept in small numbers, disease is seldom a problem. However, the odd disease case does occur from time to time.

In chickens the most likely disease to be encountered is coccidiosis. Chickens suffering from this disease have a drowsy appearance with ruffled feathers. Free blood is seen in the droppings. Sulpha drugs such as sulphaquinoxaline, sulphamerazine and sulphadimidine give good control.

Worms can be a problem in growing chickens. Treatment in mash or water with a piperazine product is effective against the large roundworm, which is the most common one.

In layers, a disease known as leucosis is likely to be the main cause of death. This disease often strikes pullets commencing to lay, and causes paralysis of the leg or wing. Another form of leucosis causes cancer-like growths on many of the internal organs. Although the disease cannot

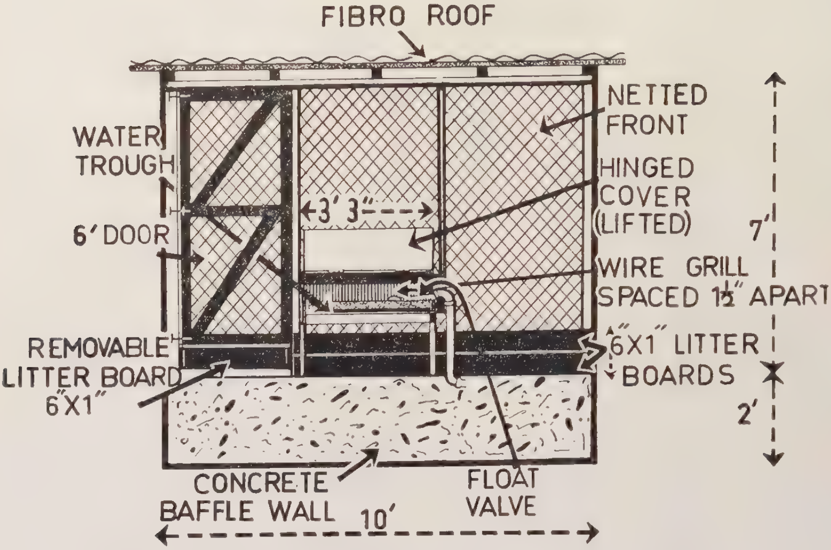


Plate 4.

Front Elevation of the House for 25 Birds.

be cured, losses can be reduced by rearing chickens in isolation from hens, for the chickens are most susceptible to the virus during the first few weeks. Even though they may contract the disease while very young, the infection remains dormant until later in life.

Parasites such as ticks, mites and lice can be a problem in the fowl house. If mites or lice are noticed on the birds, treatment should be carried out by painting the perches with BHC perch paint. When the birds perch, the fumes from this paint will kill lice or mites in their feathers. If mites or ticks are noticed on the walls of the shed, the whole shed should be sprayed with a BHC or a dieldrin preparation, at regular intervals of not more than a month, until no further mites or ticks can be found.

In general, the losses due to disease can be reduced if well-balanced, vitamin-fortified mashes are fed and attention is paid to general hygiene. Water troughs should be cleaned regularly. Feed troughs should be so constructed that contamination by droppings, a major source of disease spread, is avoided. For advice on disease problems, consult your local veterinarian or an officer of the Animal Industry Division of the Department of Agriculture and Stock.

Conclusion

Poultry farming is becoming a specialised industry and the large intensive egg-producing farms of 2,000 birds and more are nowadays regarded as essential to profitable production. Sideline production on dairy farms is unlikely to be worthwhile as a commercial proposition. However, production for the domestic requirements of the farm is quite practicable and economic, if undertaken properly.

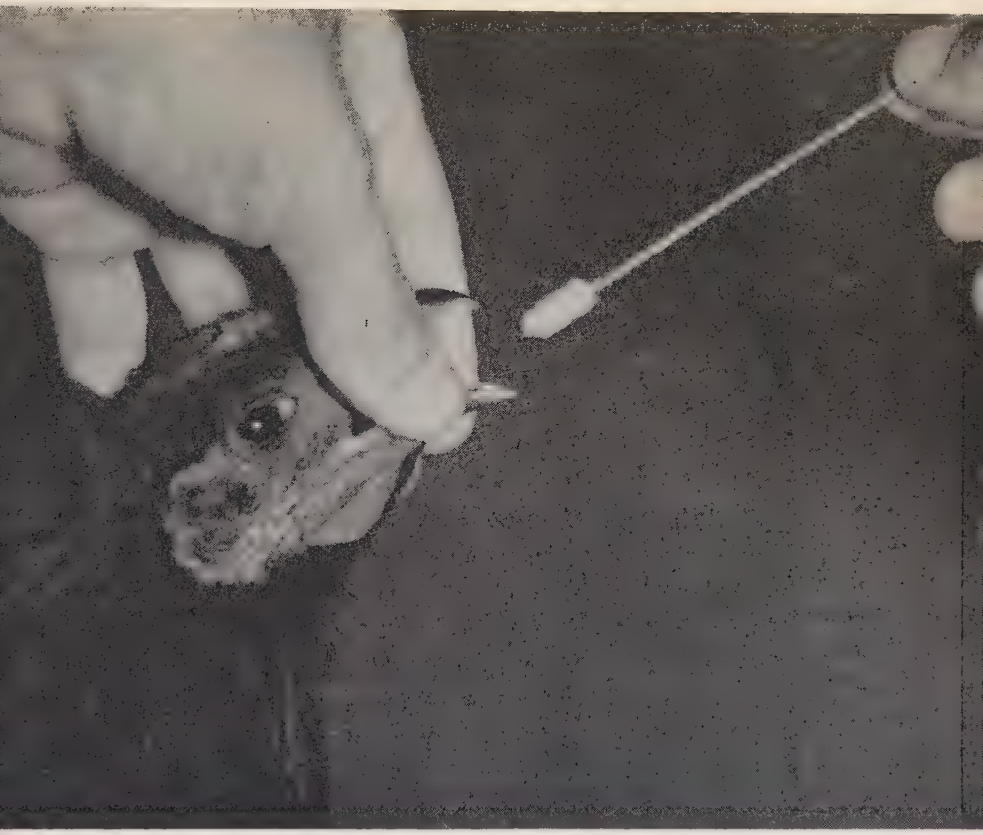


Plate 1: Removing a Cheesy Cast or Pl from the Upper Wind-Pipe of an Australo Hen Affected by I.L.T. This bird w showing signs of asphyxia.

Fowls with "Laryngo" Can be Saved

By P. D. RANBY,
Veterinary Officer.

INFECTIOUS laryngo-tracheitis (I.L.T.) is a severe respiratory disease of fowls caused by a virus. It is characterised by severe coughing, gasping, and a small proportion of swollen eyes. (See Plate 2.) Coughing of blood occurs in the more acute forms while in other cases, a plug, or cheesy cast, forms in the larynx and upper portion of the trachea or windpipe. (Plate 3). These cheesy plugs are a common feature of I.L.T. outbreaks in Queensland.

Death is due to asphyxia brought about by the blocking of the air-passage in the trachea by blood-stained mucus or by a cheesy plug.

Vaccination of the new season's chickens is fully effective in preventing outbreaks of I.L.T. However, once the disease appears in a flock, vaccination of the affected flock is of no value. This is because I.L.T. is so

Plate 2.

These Two Fowls are affected by I.L.T. Note the characteristic gaping of the Australorp's mouth as it gasps for air.

infectious that even birds still not showing symptoms are incubating the disease.

Removing The Plug

It is generally accepted that there is no treatment for infectious laryngotracheitis once outbreaks occur. Thus rather helplessly, an I.L.T. outbreak was observed in 3,500 laying fowls on a poultry farm north of Brisbane. The affected birds were coughing and gasping, and nearly all were found to have a cheesy plug in the larynx. Some fowls showed signs of choking or asphyxia, as indicated by general distress and a dark-bluish colouration of the comb and wattles.

Over 100 fowls had died in one week and deaths were continuing as the disease swept from flock to flock, the fowls having free contact with one another on range.

In desperation it was decided to try removing plugs with a wire loop from cases showing signs of choking. The wire loop, as shown in Plate 4, was just wide enough to be passed through the air-passage in the larynx. It was made from gauge 18 wire.

In cases where the air-passage was nearly closed by cheesy material, the loop was pushed through the soft cheesy mess into the upper portion of the trachea. Then pressing gently sideways, the cheesy plug was removed.

Results of Treatment

Fowls showing signs of suffocation brightened up as soon as the plug was removed. The normal pink colour returned to the comb and wattles, indicating that the blood was carrying oxygen again.

Treated fowls were placed in a separate pen. Treatment of further cases was left to the owner who was in a position to give the fowls frequent attention.

In all, 110 fowls were thus treated over a 10-day period. Only three of these died. Ordinarily, it would have

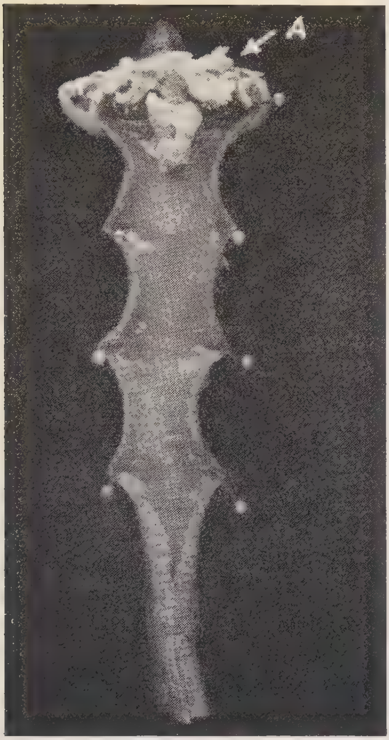


Plate 3.

Trachea (Wind-Pipe) from a Fowl Which Died from I.L.T. Note the plug (arrow A) which caused a blockage of the air passage.

been expected that most of these would have died if the plugs had not been removed.

Some 30 deaths occurred in untreated fowls during the trial. Most of these were found dead in the morning and had probably developed asphyxia during the night, while unobserved.

Thus treatment appeared to cut down the deaths considerably.

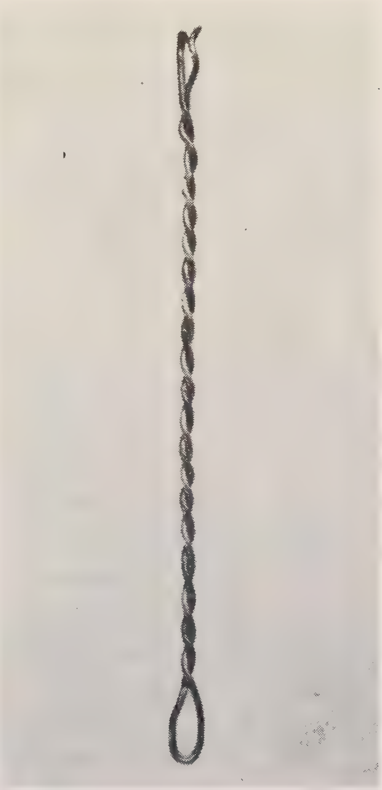


Plate 4.

Wire-Loop. Actual Size. Gauge 18 Wire. Used to Remove the Cheesy Plug.

Fowls Must be Watched

For satisfactory results, the method requires frequent observation of the fowls in order to detect cases showing signs of asphyxia.

The method is suitable for I.L.T. outbreaks where plugs in the windpipe are a common feature. It is not intended as a treatment of I.L.T. infection, but to relieve extreme respiratory distress.

* * *

Know Your Ducks

Identification of 17 species of wild duck found in Queensland is made easy in a special booklet issued by the Agriculture Department. The booklet is issued free on application to Fauna Officer, Department of Agriculture and Stock, William Street, Brisbane.

Tuberculosis-Free Cattle Herds. (As at 1st June, 1959.)

Aberdeen Angus.

G. H. & H. J. Crothers, "Moorenbah," Dirranbandi
A. G. Elliott, "Ooraine," Dirranbandi
W. H. C. Mayne, "Gibraltar," Texas

A.I.S.

M. E. & E. Scott, "Wattlebrae" A.I.S. Stud, Kingaroy
F. B. Sullivan, "Fermanagh," Pittsworth
D. Sullivan, "Bantry" Stud, Rossvale, *via* Pittsworth
W. Henschell, "Yarranvale," Yarranlea
Con. O'Sullivan, "Navillus" Stud, Greenmount
H. V. Littleton, "Wongelea" Stud, Hillview, Crow's Nest
J. Phillips and Sons, "Sunny View," Benair, *via* Kingaroy
Sullivan Bros., "Valera" Stud, Pittsworth
Reuschle Bros., "Reubydale" Stud, Ravensbourne
A. C. and C. R. Marquardt, "Cedar Valley," Wondai
A. H. Sokoll, "Sunny Crest" Stud, Wondai
W. and A. G. Scott, "Welena" A.I.S. Stud, Blackbutt
G. Sperling, "Kooravale" Stud, Kooralgin, *via* Cooyar
C. J. Schloss, "Shady Glen," Rocky Creek, Yarraman
W. H. Thompson, "Alfa Vale," Nanango
S. R. Moore, Sunnyside, West Wooroolin
H. M. State Farm, Numinbah
L. R. Dennis, Diamondvale, Mundubbera
Edwards Bros., "Spring Valley" A.I.S. Stud, Kingaroy
D. G. Neale, "Grovely," Greenmount
A. W. Wieland, "Milhaven" A.I.S. Stud, Milford, *via* Boonah
W. D. Davis, "Wamba" Stud, Chinchilla
Queensland Agricultural High School and College, Lawes
C. K. Roche, Freestone, Warwick
Mrs. K. Henry, Greenmount
D. B. Green, "Deloraine" Stud, Durong, Proston
E. Evans, Wootha, Maleny
T. L. and L. M. J. Cox, "Seafield Farm," Wallumbilla
J. Crookey, "Arolla" A.I.S. Stud, Fairview, Allora
M. F. Power, "Barfield," Kapaldo
A. H. Webster, "Millievale," Derrymore
W. H. Sanderson, "Sunlit Farm," Mulgildie
R. A. and N. K. Shelton, "Vuegon" A.I.S. Stud, Hivesville, *via* Murgon
R. R. Radel & Sons, "Happy Valley," Coalstoun Lakes
C. A. Heading, "Wilga Plains," Maleny
G. S. and E. Mears, "Morden," M.S. 755, Toogoolawah

Ayrshire.

L. Holmes, "Benbecula," Yarranlea
J. N. Scott, "Auchen Eden," Camp Mountain
E. Mathie and Son, "Ainslie" Ayrshire Stud, Maleny
B. Goddard, Mt. Tyson, *via* Oakey
C. E. R. Dudgeon, "Marionville" Ayrshire Stud, Landsborough
G. F. H. Zerner, "Pineville," Pie Creek, Box 5, P.O., Gympie
T. F. Dunn, Alanbank, Gleneagle

Friesian.

C. H. Naumann, "Yarrabine" Stud, Yarraman
D. J. Pender, "Camelot," Lytton road, Lindum
S. E. G. Macdonald, "Freshfields," Marburg

Guernsey.

C. D. Holmes, "Springview," Yarraman
A. B. Fletcher, Cossart Vale, Boonah
W. H. Doss, Degilbo, *via* Biggenden
A. C. Swendson, Coolabunia, Box 26, Kingaroy
C. Scott, "Coralgrae," Din Din Road, Nanango
R. J. Wissemann, "Robnea," Headington Hill, Clifton
G. L. Johnson, "Old Cannindah," Monto
A. Ruge & Sons, Wowoonga, via Biggenden
G. Miller, Armagh Guernsey Stud, Armagh, M.S. 428, Grantham
N. H. Sanderson, "Glen Valley," Monto

Jersey.

Queensland Agricultural High School and College, Lawes
J. S. McCarthy, "Glen Erin" Jersey Stud, Greenmount
J. F. Lau, "Rosallen" Jersey Stud, Goombungee
G. Harley, Hopewell, M.S. 189, Kingaroy
Toowoomba Mental Hospital, Willowburn
Farm Home for Boys, Westbrook
P. J. L. Bygrave, "The Craigan Farm," Aspley
R. J. Crawford, "Inverlaw" Jersey Stud, Inverlaw, Kingaroy
P. H. F. Gregory, "Carlton," Rosevale, *via* Rosewood
E. A. Matthews, "Yarradale," Yarraman
A. L. Semgreen, "Tecoma," Coolabunia
L. E. Meier, "Ardath" Stud, Boonah
A. M. and L. J. Noone, "Winbirra" Stud, Mt. Esk Pocket, Esk
W. S. Conochie and Sons, "Brookland" Stud, Sherwood road, Sherwood
Estate of J. A. Scott, "Kiaora," Manumbar road, Nanango
F. W. Verrall, "Coleburn," Walloon
C. Beckingham, Trouts road, Everton Park
G. H. Ralph, "Ryecombe," Ravensbourne
Mrs. I. L. M. Borchert, "Willowbank" Jersey Stud, Kingaroy
Weldon Bros., "Gleneden" Jersey Stud, Upper Yarraman
D. R. Hutton, "Bellgarth," Cunningham, *via* Warwick
J. W. Carpenter, Flagstone Creek, Helidon
H. G. Johnston, "Windsor" Jersey Stud, Beaudesert
S. A. Cramb, Bridge street, Wilsonton, *via* Toowoomba
J. A. & E. E. Smith, "Heatherlea" Jersey Stud, Chinchilla
W. C. M. Birt, "Pine Hill" Jersey Stud, Gundiah
T. Nock, Dallarnil
P. Fowler & Sons, "Northlea," Coalstoun Lakes
F. Porter, Conondale
H.M. State Farm, Palen Creek
B. T. Seymour, "Upwell" Jersey Stud, Mulgildie
R. N. Burrows, Box 23, Wondai
W. T. Tatnell, Cedar Pocket, *via* Gympie

Poll Hereford.

W. Maller, "Boreview," Pickanjinnie
J. H. Anderson, "Inverary," Yandilla
D. R. and M. E. Hutton, "Bellgarth," Cunningham, *via* Warwick
E. W. G. McCamley, Eulogie Park, Dululu
Wilson and McDouall, Calliope Station, Calliope

Poll Shorthorn.

W. Leonard & Sons, Welltown, Goondiwindi

Economic Feeding Of Our Dairy Herds—Part I.

By W. F. MAWSON,
Senior Adviser in Cattle Husbandry.

This article deals with the subject of feeding the commercial dairy cow. An attempt is made to indicate an economically sound system for providing a feed supply on a herd basis.

Farmers wishing to obtain maximum production from individual cows will require more detailed information. At present levels of returns in the dairy industry, feeding a commercial herd for maximum production is not the most profitable system. However, there is also a stage where under-feeding is equally unprofitable. Between these two extremes of full feeding on one hand and gross under-feeding on the other lies the level of most profitable feeding.

That level must be the aim of the commercial dairyfarmer.

The level of production which is most profitable will vary between farms—it may vary from year to year on the same farm. Many factors influence it. The relative costs of different types of feed, area and fertility of land, availablity of farm machinery, labour cost, weather conditions, return from sidelines, age of the herd, the price received for the product and the farmer's managerial skill are all variable. While recognising the effect of all these variable factors, evidence is available which allows some forecast of levels of production which are practicable under various conditions in the State.

The level of production is governed by the three broad factors of breeding, feeding and management. All play their part. In practice, improvement or advancement in one aspect soon results in improvement of the other two.

Improvement in production through breeding is a long-term project. Once the aim of breeding is clear and the necessary steps taken to achieve the aim, there is little that can be done but await results.

Management and husbandry reflect the skill and ability of the farmer. They are absorbing tasks requiring planning as well as daily attention.

However, in Queensland dairy herds, the greatest avenue for increasing net returns to dairy-farmers is through better feeding. In addition, the results become evident within a short space of time. If the farms with the highest and lowest producing herds within one district are compared, the differences in production can be attributed largely to the quantity and quality of feed which is available to the herds.

Variation in the composition of milk is a problem which usually reaches its height in spring. It

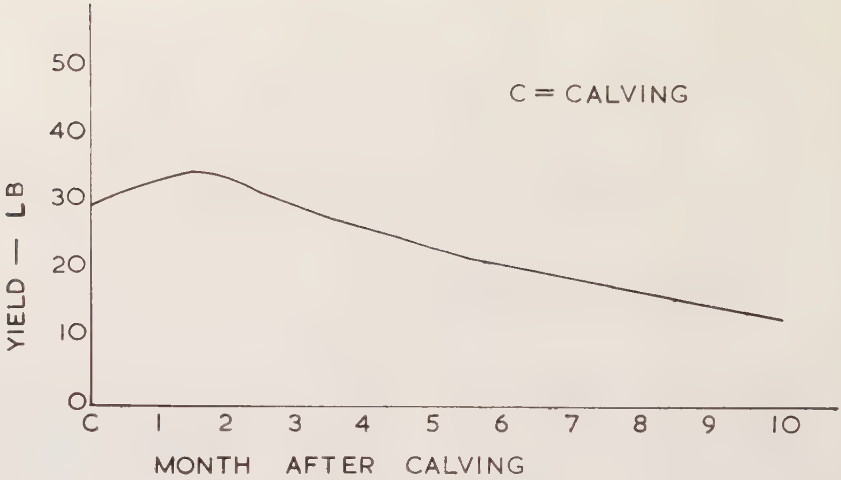


Plate 1.

A Normal Lactation Curve.

appears to be more severe on farms with a poor feed supply. Having the herd in good condition and on a reasonable plane of nutrition should result in less trouble from this source.

Dairy cows are remarkable animals. Within limits they can adapt themselves to a wide range of climatic conditions; they can digest coarse feeds unsuitable for other animals, and store reserves of fat, muscle and minerals for use when needed. Cows can eat material of little or no use as human food and convert it to highly digestible and nutritious human food.

But they are not magicians. They cannot make something out of nothing.

To produce milk, the raw products must be obtained as feed, principally at the time of production but also to a limited yet important extent, when dry.

Normal Pattern of Prodution

Production of cows fed at a reasonable level before and during lactation follows a fairly regular pattern. This is known as "the lactation curve." Examination of lactation curves provides us with evidence on the effect of nutrition on production. The typical lactation curve shows that peak production should be reached between the fourth and sixth week after calving. It then declines at the rate of about 10 per cent. each month. Plate 1 shows a normal lactation curve for a cow producing about 700 gal. in 10 months.

Compare this with the curves in Plate 2. The top line in Plate 2 is the curve for cows calving in August in a number of recorded herds in south-east Queensland which average between 180 and 200 lb. butterfat (220–250 lb. commercial butter) a cow yearly.

The broken line in Plate 2 is the "curve" for cows calving in August in the same district in herds whose average production is less than 100 lb. butterfat (120 lb. butter) a cow yearly. While the curve for the higher producing cows does not show a distinct peak (possibly because the production from the start of lactation to the first month of recording is not known), production is maintained at a fairly high level.

The response to improved pastoral conditions is seen in January and a reasonable level of production is maintained to the end of lactation. By contrast, note the constant decline in production right from calving and the short lactation of cows in the low producing herd. There is a short rise in January due to the flush of grass, but the cows were dry at the end of March.

A study of lactation curves is a very practical proposition as it leads to an understanding of the pattern of production. From this understanding, develops a knowledge of the best means of using feedstuffs. Commercially, we have to accept the situation that stock may not always be adequately fed, either from the viewpoint of quality or quantity. Underfeeding always takes its toll but its ill-effects are less serious at some stages of lactation.

Although at a considerably higher level, dairy production in New Zealand has a similar basis to Queensland. Their dairy economy is based on pastures and conserved pastures and they face periods when feed supply is short. Workers there have studied the effect on milk production of underfeeding for fixed periods, either during lactation or in the preceding dry period.

One point stands out as being of great importance to Queensland dairy farmers. It is this:

Production during lactation and also length of lactation are largely dependent on the establishment of peak production (the highest point of the lactation curve) in from four to six weeks after calving.

What does this entail? Firstly, it means that the dry cow must receive the necessary attention. She needs enough feed to build up body weight ("condition") and reserves of the minerals, calcium and phosphorus. At calving she should be relatively fat. These reserves of weight and minerals are used up for milk production. Secondly, if feed has to be bought, give it to the cows which are freshly calved.

The well-fed dry cow in good body condition should be a "must" on every dairy farm. An examination of production patterns for the State indicates neglect in this respect.

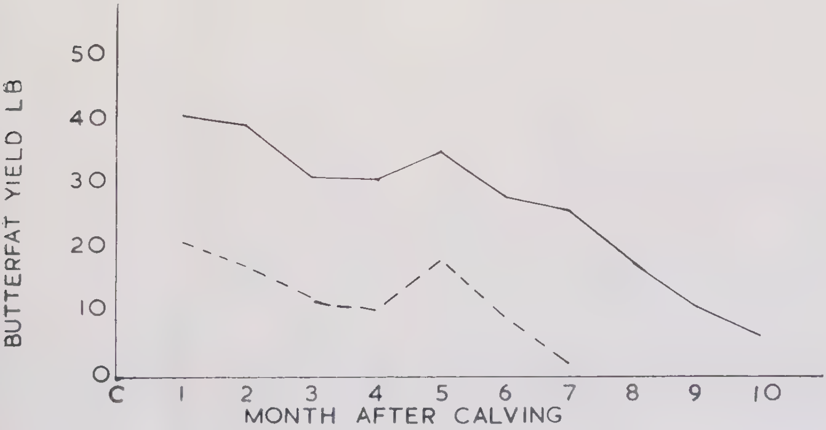


Plate 2.

Lactation Curves of Cows in Selected Herds in South-East Queensland.

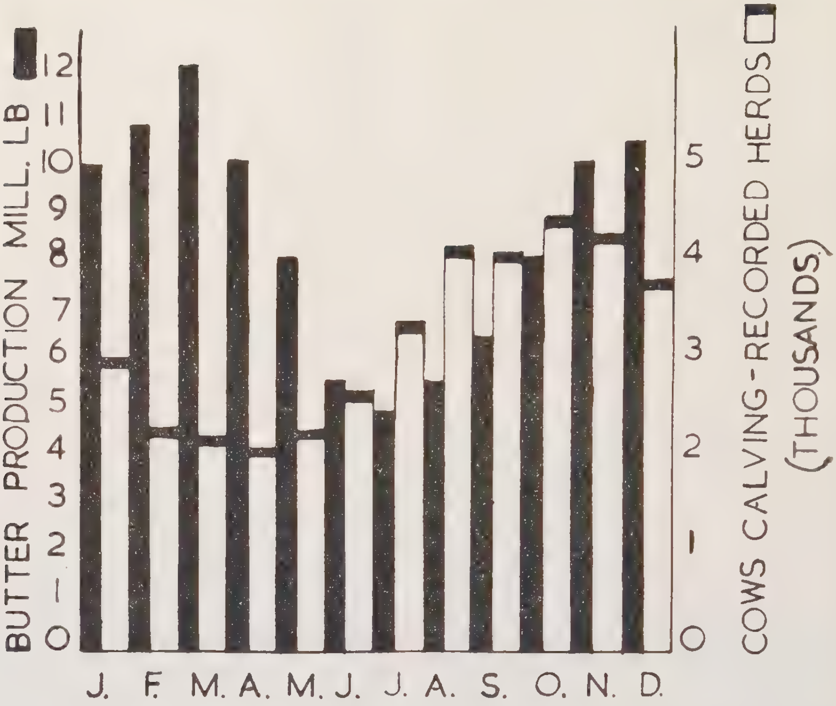


Plate 3.

Queensland Butter Production by Months in Relation to Month of Calving in a Cross-Section of Herds.

Cows in poor body condition at calving time produce at a low level since a relatively high proportion of the food eaten is used to build up the body condition previously lost. By the time body condition has been regained, the first flush of lactation has been lost and often the quality of pasture is again declining.

Queensland Production

Queensland's average butter production month by month for 3 years, 1953–55, is shown in Plate 3. Alongside the column of butter production is shown the number of cows calving month by month in herd-recorded herds for the same period. Time of calving in these herds is taken to be representative of the distribution of calvings in all herds in the State.

The figures show that more cows calve in October than in any other month. The four months of greatest calvings are August to November, inclusive. If cows calved in good condition and there was a reasonable level of nutrition for the duration of lactation it would be logical to expect production figures to follow a similar pattern to calvings. Remembering that peak production should be reached in from one to two months after calving, the production curve would be one month or so behind the "time of calving" curve.

In fact, the position is quite different. Actual production figures show a peak in March, followed by February and December. Except in years of abnormal rainfall distribution, there is sufficient high quality grass in dairying districts by the end of January to ensure top production. Why then, is top production delayed until March? The main reason lies in the fact that many dairy cows are in poor body condition in January and are forced to use the high quality young grass available to increase body weight. This takes from 6 to 8 weeks. The lag in reaching peak production can be overcome if cows are maintained in good body condition. Animals in good condition on low quality feed will respond quickly to high quality feed provided production has not fallen to a very low level and the cows are still in the first half of lactation.

Three First Principles

The first principles which require application are:

1. Maintenance of the herd in good body condition through the year. Except in special cases, such as the availability of waste products (wet brewer's grains or pineapple pulp) or the purchase and storage of fodder during a glut when prices are low, *the fodder for this purpose should be produced on the farm.* It is difficult to see how dairying can be a profitable main enterprise on farms incapable of providing adequate feed for this purpose at a reasonable cost.

This problem is primarily one of *quantity* of suitable feed. The quality of feed can be quickly improved by purchased concentrates if necessary. The dairyman whose herd is in good condition is able to choose whether to buy feed. He will only do so if the extra returns are greater than the cost of buying and feeding out. The unfortunate position of some farmers is that they are often forced to buy comparatively high-priced feed in an effort to keep their animals alive.

2. An adequate ration for dry cows, building up to a peak at calving.

3. Sufficient feed of both quantity and quality throughout the lactation period, particularly during the first six weeks.

In order to achieve 1, a continuous supply of feed of reasonable quality is needed. Is this practicable and if so, how is it to be achieved?

Feeding Based on Pasture

Pastures grown under natural rainfall conditions are the basis of feeding for the State's dairy herds. For this reason some consideration will now be given to the productive value of the pastures which are available.

The value of pasture as a feed for dairy cows depends on the quantity and quality of the material and the period when it is available. Under dryland conditions this in turn depends basically on:—

(*a*) The fertility and structure of the soil.

(*b*) The species of grass or grasses.

(*c*) Climatic conditions—

  (i.) Incidence, distribution and reliability of rainfall.

  (ii.) Other climatic factors—particularly the effect of extremes of temperature.

(*d*) Whether legumes can be successfully grown.

(By "quantity" is meant the bulk weight of the material produced. "Quality" is a somewhat general term which in this usage refers to protein and fibre levels in addition to palatability and digestibility. For practical purposes we can think of it in terms of amount of protein since most feeds containing a comparatively high percentage of protein have a low fibre content and are highly digestible, although all are not palatable).

The following should be considered in connection with the foregoing points:

(*a*) *Soil fertility and structure*: Grasses growing on fertile soil will outyield the same species of grass on poor soil. The water-holding capacity of the soil is most important. On soils which hold moisture, grass will remain in a productive state for weeks longer compared with the same grass on a soil which dries out quickly.

(*b*) *Species of Grass*: All species of grass are different, but some attempt will be made at grouping the main ones from the point of view of dairy production. It is sufficient to state here that all grasses have a productive season limited by such factors as light, temperature and moisture conditions and no one grass will grow satisfactorily all the year round.

Under dryland conditions, practically all Queensland's pastures are summer-growing species. This is because of the lack of suitable rainfall in the winter and spring.

(*c*) *Reliability of Rainfall*: Total rainfall figures can be misleading. The "spread" or distribution of rain is much more important than the total quantity which falls. Prevailing temperatures, the nature of the wind and the presence or absence of cloud are other factors. For example, an isolated inch of rain in early December would be little use if followed by two or three days of clear skies, strong winds and high temperatures. A similar amount of rain in May followed by a few calm, cloudy cool days may be very beneficial.

On the subject of rainfall, Mr. J. C. Foley has published a book entitled "Droughts in Australia." He surveys the period from 1871 to 1955 and lists a table of droughts. For this purpose a "drought" is defined as "a dry period of over three months' duration." In the 84 years to 1955, south-east Queensland has had 12 such droughts and the Central Coast—between Gladstone and Bowen—has had 22 droughts. Thus the average for south-east Queensland is one drought every 7 years while it is one in less than every four years for the Central Coast.

It should be recognised further that a dry spell of considerably less than 3 months' duration will bring pasture growth to a standstill except in low lying or swampy areas.

(*d*) *Legumes*: Legumes are plants such as clovers, peas and lucerne which are rich in protein and minerals and provide nutrients which contribute to the vigorous growth of associated grasses. Furthermore, the feeding value of legumes does not decline so quickly with age and maturity as compared with grasses. The presence of legumes is regarded by many authorities as a necessity if permanent pastures of high productivity are to be maintained.

Pasture Potential

Table 1 is designed as a guide to the production which can be expected from a herd under different pastoral conditions and without any other feed. If no attempt is made to supplement such pastures the production given will approximate total production. The table gives an indication of the relative productive values of the main pastures on which dairying is carried out in the State.

For higher production and returns, some additional measures of improving the feed supply are needed.

What should be done? Since pasture is usually the cheapest form of feed, the first step is to utilize it to

TABLE 1.

Grass SPP.	Production.				Value.	
	Per Cow/Year.		40 Cows.		Milk at 3/– gal.	Butter at 3/6 lb.
	Milk. (gal.)	Butter. (lb.)	Milk. (gal.)	Butter. (lb.)		
					£	£
Native Grasses Matt grass . . Couch grass	200	100	8,000	4,000	1,200	700
Rhodes . . Molasses . . Green Panic Guinea Grass Buffel . . Paspalum . .	300–350	140–160	13,000	6,000	1,950	1,050
Kikuyu and Mixtures of above . .	350–380	160–185	14,600	7,000	2,190	1,225

the full. The fundamentals of improved use of pasture are: (*a*) making more pasture available by the clearing of logs, other obstructions and weeds; (*b*) increasing productivity by renovation, fertilization, having a variety of grasses. inclusion of legumes and so on; (*c*) improving utilization by strip grazing, deferred grazing, planned stocking and grass conservation when practicable.

Pasture as Source of Feed

Irrespective of how productive and well managed a dryland pasture is, it is subject to limitations which will vary considerably from year to year. Any one or combination of the circumstances listed can leave the pasture farmer without a reasonable feed supply:

1. Prolonged dry weather.
2. Heavy frosts either at the beginning or end of winter especially if followed by a dry spell.
3. Attacks by insects such as caterpillars or grass hoppers.
4. Floods.
5. Fire.

From May to August, the spring and summer growing grasses are in a dormant state and a reserve of grass has to be accumulated in the paddock for this period if it is the only source of feed supply.

Considered from the viewpoint of quality, young growing grass ranks high. The protein content then falls gradually until flowering. The fall is then accelerated until seeding, after which it drops quickly to a very low level. Frosts, rain and heavy dews also bring about deterioration of mature grass. The value of legumes is evident here in that they have a high protein content which does not drop to the same extent as that of grass and is still quite fair in the mature plant.

Supplementing the Pasture

When a herd is maintained throughout the year on rain grown pastures, whether improved or unimproved, there will be periods in all years when feed is inadequate in quantity and/or quality for the needs of the herd. In looking for the best means of filling in the gaps when improved pasture is inadequate, we will discuss briefly the pros and cons of the various main methods. Of course, combinations of supplements can be used and it is for each man to decide on the system which best suits his particular circumstances.

Firstly, let us consider the possibilities. These are listed in what is considered to be a normal order of cost on a food unit basis beginning with the cheapest, and taking harvesting costs into account where necessary. The assumption is made that soils are capable of producing reasonable yields.

1. Irrigated pasture.

2. Summer and winter grazing crops and lucerne.

3. (*a*) Standing crops such as cow cane or elephant grass. (*b*) Farm-produced hay, silage or grain.

4. Purchased grains or hay.

For purposes of discussion and illustration we will assume that rain-grown pasture quality is low from May to August and that quantity and possibly quality are lacking from September to the end of December.

Water Must Be Ample

1. *Irrigated pasture*: This is satisfactory provided there is ample suitable water available when it is most needed—that is in the driest time. To obtain maximum benefits from irrigated pastures they should be used in conjunction with rain-grown pastures. Rain-grown pastures can supply cheaply a large portion of the animals' needs for carbohydrates with irrigated pasture providing a supplement of highly digestible, protein-rich feed.

2. (*a*) *Summer grazing crops such as sudan grass, white panicum, etc., with cow pea or other suitable legume*: The summer grazing crops are most useful either at the beginning of summer or the beginning of autumn. On most farms there is plenty of pasture during mid and late summer. The early crop may provide grazing in November if conditions have been good or irrigation has been possible. On the other hand if a late planting—say February—is possible, useful grazing may be obtained in April and May extending into June in some districts if conditions are favourable.

Care must be exercised in grazing plants of the sorghum family (sudan grass is the most common one) because of the possibility of prussic acid poisoning. The precautions consist of a trial grazing using the least valuable animal, observation of the herd while grazing and a knowledge of the symptoms and treatment should poisoning occur. One pound or so of photographic hypo should always be on hand for treatment.

2. (*b*) *Winter grazing crops such as oats and wheat with field peas, vetches or tares*: These crops are very useful because they supply high quality grazing when the summer pastures have lost or are rapidly losing their content of digestible protein. Grazing should be available during May if an early planting is made.

Planting additional areas at intervals of about 3 weeks should give a continuity of grazing during the winter months. In most years, little reliance should be placed on the winter grazing crops for feed after the end of September.

In order to get several grazings from one crop some winter rainfall or irrigation is needed.

Digestive upsets and mineral imbalances sometimes occur in animals grazing on winter crops.

The heavier the grazing crop the more profitable it is. Payable crops can be grown only on suitable soils and by using sound cultural methods.

2. (*c*) *Lucerne*: While the crops already mentioned are best treated as annuals, lucerne can be expected to last for a number of years without replanting. Lucerne develops long roots and can withstand dry weather better than any other similar plant. It will produce some feed over most of the year. When planted alone,

lucerne is often used for hay production plus some grazing. Lucerne provides high quality grazing but care has to be taken to prevent stock losses from bloat. Spraying the material before grazing with a tallow-detergent mixture promises to give control when lucerne (or pastures for that matter) are causing bloat. Mowing and wilting the lush lucerne before giving the herd access to it is another method of reducing the incidence of bloat.

3. (*a*) *Standing crops such as cow cane or elephant grass*: These are heavy-yielding crops which provide a bulk of reserve feed in the paddock. They are a useful standby, particularly in an unfavourable spring and early summer. The overhead cost of this form of feed is low because of the comparatively small area of land involved and no storage facilities are necessary. However, they make a continuous drain on labour for feeding out, as the material has to be cut at least every second day and transported. Chaffing of the material avoids wastage in feeding and enables the herd to eat it in a shorter time.

This type of fodder is best suited to those farms with good pastures and only a small area of land suitable for cultivation. When climatic conditions are favourable, the pastures may carry the herd through the year and the standing cane becomes a reserve. However, for purposes of regrowth the cane should be cut at intervals of not more than 18 months regardless of whether it is needed for fodder. Further information should be obtained on the management of elephant grass.

3. (*b*) *Farm-produced hay, silage or grain*: Lucerne hay is possibly the most valuable form of conserved fodder because of its high food value and convenience in feeding out. Oaten and wheaten hay are subject to damage by rats and mice and are not greatly favoured. Hay made from the summer crops is often fibrous and of low food value. Surplus pasture is sometimes available in March or April but weather conditions at that time are uncertain for hay making. Time of cutting has a big influence on hay quality.

Plan Ahead

Green crops can be ensiled successfully provided the correct methods are used and the silo is suitable. Surplus grass would appear to be a cheap source of material for ensiling but there are two important points which should not be overlooked. Firstly, it is necessary to plan ahead and prepare the paddock intended for grass silage. Secondly, a minimum of 20 tons of green material should be available at one time. This is a disadvantage compared with hay of which as little as a few hundredweight can be successfully made at one time if desired.

The summer-growing crops such as maize and sorghum, with or without a suitable legume, are very well suited for silage purposes. They grow readily in most parts of the State and are probably the simplest of all crops from which to make good silage.

Silage is one of the surest forms of conservation since it is fire and flood proof (if properly sited) and can be made under weather conditions which would prevent hay-making. Silage is also a very suitable fodder for feeding to stock under dry conditions as it is succulent and slightly laxative. It is rather bulky to handle but modern machinery removes the hard physical labour from silage-making.

Grains warrant consideration in districts where they can be readily grown. They are economical to store and easy to feed out. Grains should be rolled, crushed or coarsely ground before being fed.

4. *Purchased grains or hay*: The buying of hay or grain may be

sound business if it is part of a predetermined policy to buy and store when prices are low. The essentials of good buying are to know the type of feed required and then buy it in its cheapest form. The tables in Part 2 show the values of common feeds. There are also examples of how to estimate the cost per feed unit.

In addition to the main types of feeds described there are others which are useful where available. These include the stubble of maize, sorghum, oats or wheat; peanut straw; sweet potatoes, both vines and tubers; swede turnips and mangels.

Waste products which are available on a limited scale are wet brewer's grains, pineapple pulp and molasses. The latter two are not available for the whole year but molasses can be stored in drums.

Which Type of Feed?

The decision on the type of feed to use in order to supplement pastures will vary from farm to farm and depends on many factors. The more important ones are:

(*a*) The quantity and type of feed required. If plenty of low quality roughage is always available then grazing crops or grain plus a protein concentrate may be a good choice. On the other hand if quantity is needed, silage or lucerne hay may be the answer.

(*b*) The months over which it will be required. For example a winter grazing crop does not supply feed in December.

(*c*) The type of farm. If arable land is very limited a high yielding crop will be needed.

(*d*) The machinery which is owned or can be purchased or hired.

(*e*) The facilities for feeding the cows.

(*f*) The main calving season for the herd.

(*g*) Periods over which milk quotas are determined.

(*h*) Whether product has to be supplied all the year round.

(*i*) The amount of time which is available for producing and handling feed.

(*j*) If the only requirement is for a protein-rich supplement for a short period, the purchase of a protein-rich concentrate may be the best proposition.

Concentrate Feeding

Concentrate feeding presents a knotty problem and will be considered in the two sets of circumstances which are common.

Concentrates are feeds of high food value without being bulky. The main ones concerning the dairying industry are the various grains, bran and pollard, and the meals such as meat and bone, cottonseed, peanut, linseed and coconut and proprietary mixtures made up by various firms.

Let us consider the first circumstance of a farmer who produces grain on his own farm:

Suppose a farmer has a crop of sorghum which he wishes to use as fodder for his herd. He can either make silage or head the crop and feed the grain as well as allowing the herd to eat the standing stubble. If he has grain-harvesting machinery and facilities for storing and feeding out the grain without the equivalent for silage, then the utilization of the crop as grain and stubble is probably justified. In this case it is convenient and possible to use a concentrate rather than a roughage.

Similarly, when fodder has to be bought, the best value for money should be obtained. If concentrates are the most economical buy, there would appear to be no good reason why concentrates should not be the choice.

However, the more common approach to concentrate feeding concerns the feeding of concentrates in order to obtain extra production. Will concentrate feeding do this economically? This is a question which is of importance to many farmers. The answer depends mainly on the following considerations:

1. The stage of lactation of the animals and present level of production.
2. The productive capacity of the animals.
3. The type of feed otherwise available.
4. The length of time over which concentrates may have to be fed.
5. Feeding the correct type of concentrate according to the nature of the basic ration.
6. The cost of the concentrate.
7. The price received for milk, cheese or butter.

The Basic Ration

It will be necessary to consider the basic ration before discussing further the pros and cons of concentrate feeding.

The main portion of this article is directed towards the need to maintain a continuous supply of good quality, cheaply produced feed. This basic ration is often termed the "roughage" ration and when the term "good quality roughage" is used it refers to such items as growing pasture or crops, lucerne hay or good silage. Examples of low protein roughage would be mature pasture, poor silage, cow cane, stubble, and so on.

For purposes of estimating feed requirements for dairy cows it is convenient to consider that there are two components to the daily ration. The first part is known as the maintenance ration. This is defined as the amount of feed required to maintain an animal for 24 hours without its gaining or losing weight and without any milk production. The production ration is the part used for milk production and can be estimated as a certain amount of feed per gallon of milk.

These distinctions are convenient but not clear cut. For example, when a cow in milk is fed a maintenance ration only, she does not cease to milk entirely but draws on her body fat and muscle for some milk production as long as these reserves are available. Of course, this is done only at the expense of future production.

There is another feature which distinguishes a maintenance ration from a production ration. The protein content of the ration must be higher for purposes of production. From ½ to ¾ of a pound of digestible protein is needed for maintenance of a mature dairy cow and about half a pound of digestible protein is needed for each gallon of milk. Thus a cow producing three gallons of milk a day needs nearly four times as much protein as a dry cow, unless the dry cow is getting close to calving. It follows that a cow producing at this or lower levels requires a ration of higher quality in terms of protein content than does a dry cow.

Below 50 Per Cent.

In the United States of America it has been estimated that good cows provided with all the high quality roughage they will eat but no concentrates will attain about 85 per cent. of their basic producing capacity. When medium quality roughage is fed this falls to 75 per cent. and further to 64 per cent. when poor quality roughage is fed. In Queensland we have a further situation where not only is the roughage of very poor quality for most of the year but it is also lacking in quantity. There the production attained is probably well below 50 per cent. of the basic producing capacity.

Under the conditions outlined, the farmer with good quality roughage is in a position to feed concentrates if it pays him. He will want an increase in milk production which more than pays for the cost of buying and feeding the concentrates. A small scale trial will soon give him the answer. At the other extreme where the roughage is lacking in both quality and quantity, any extra feed received will go primarily towards maintenance of the animals. The position thus is that high-priced concentrates are being used to do a job which should be done by the cheaper farm-produced roughage.

It is suggested that the basis of sound dairy practice is to be in the position to feed concentrates if it pays. Besides the immediate return in sales of produce there are other factors worth considering and for which there may not be an immediate return. These are:

1. Under certain conditions concentrate feeding has the effect of reducing the quantity of feed eaten in the paddock.

2. Increased production may mean more skim milk for pigs, thus saving overall farm feed costs.

3. Concentrates may be the best means of balancing a diet which is deficient in just one respect. Protein is the factor usually involved in this case.

4. The use of concentrates may be justified to prevent a drop in production due to a short-term gap in the feed supply. This would most commonly occur in the period before the wet season when calving in spring is practised.

In summing up, it is probably true to say that the farmer who is likely to make money from concentrate feeding is the one with the best basic ration. The uneconomic position arises when a farmer is forced to buy concentrates to use as a maintenance ration for his herd.

No mention has been made of the feeding system described by Professor Boutflour of England. His method is to supply the cow with large amounts of good quality concentrates and only enough roughage to maintain her bodily functions in good working order. Stalling of animals and frequent feeding and milking are necessary. There are difficulties in the large scale application of this method in Queensland under present conditions.

Continuous Feed

A continuous feed supply does not just happen. Planning is necessary—not only for normal conditions but also for a reserve to deal with the inevitable dry spell or crop failure. The farmer who relies on favourable seasonal conditions for the supply of feed is sure to be disappointed frequently in most of Queensland's dairying areas.

The steps in planning are to decide what form the feed supply will take, how much will be needed and when it will be needed.

By way of example, take the case of a farmer with a herd of 40 Jersey cows who has Rhodes grass and green panic plus a little lucerne in pasture mixtures. He can grow winter grazing crops and the summer crops such as maize and sorghum.

We will consider the feed supply by the calendar:

January to April: With the possible exception of January the pastures will be quite good and no other feed is necessary.

May to September: The pasture will vary, depending on the season, but can be expected to provide fair quality roughage. Some good quality feed is needed for production. This could take the form of a winter grazing crop such as oats and there may be some lucerne grazing. If oats is used, about $\frac{1}{3}$ of an acre for every cow will be needed—that is, from 13 to 15 acres altogether.

October to December-January: This is usually the most difficult period. There may be a good spring growth of pasture if storms are plentiful and frequent but more often the pasture is very short and providing only a fraction of the animals' needs. Lucerne grazing will supply a little high quality feed but there will still be a lack of quantity.

The possibilities could be:—

(*a*) Lucerne hay; or

(*b*) Cow cane or elephant grass; or

(*c*) Silage—either crop or grass.

Based on Four Months

The quantities shown are based on a period of four months, assuming that pasture is a doubtful quantity in January. The allowance made per cow daily is an average, bearing in mind that some pasture is also available. There would also be an overlap in feeding. For example, silage feeding should start a week or 10 days before crop grazing finishes and the amount fed would be steadily increased from 10 lb. daily up to the limit.

(*a*) *Lucerne Hay*—10 lb. daily for 120 days = roughly half a ton per cow or 20 tons for 40 cows. This quantity could be produced from about 8 acres without irrigation in a reasonable lucerne growing district. Higher yields would be obtained under irrigation.

(*b*) *Cow Cane or Elephant Grass*: 40 lb. daily for 120 days = roughly 2 tons per cow or 80 tons for 40 cows. This could be grown on 2-4 acres of suitable land. Cow cane normally yields the greater weight of material per acre.

(*c*) (*i.*) *Grass Silage*—40 lb. daily = 80 tons for 40 cows. Probably between 14 and 20 acres of grass would be needed.

(*ii.*) *Maize or Sorghum Silage*—40 lb. daily = 80 tons for 40 cows. From 8 to 12 acres of this crop would produce this quantity.

With such a feeding system, yields of from 460 to 600 gal. of milk or 225-275 lb. of commercial butter per cow yearly are quite practicable.

This is an example of normal yearly needs and allows nothing for reserves. Such reserves are needed to meet the situation when the winter feed supply fails and/or the spring and early summer feeding is prolonged or at a heavier rate. The conservation of 1 ton of hay or 3 tons of silage per cow in addition to normal requirements could be regarded as a reasonable fodder reserve.

* * *

Book for Pig Raisers

A book written for the pig raiser and the student is L. A. Downey's revised edition of "Pig Raising." Mr. Downey's first-hand knowledge of his subject springs from his experience as a pig husbandry specialist in Queensland, New South Wales, and Victoria. This book is reliable and authoritative. The revised edition is well-illustrated with photographs and drawings to meet present-day requirements.

Pig Raising by L. A. Downey, H.D.A., Second Edition. Revised 1958. Angus and Robertson, Sydney. Price 45s.

Bucket and Bail

DANGEROUS enemies of the keeping quality of milk are hidden in the dust in and around milking sheds. These are the bacteria that cause milk to go sour and curdle. The dust menace around milking yards can be greatly reduced by the proper layout of the dairy shed. Provision of a grassed, stock-free area around the milk room will be a great help.

When planning a new shed, give some thought to the prevailing winds. Even with a grassed, stock-free area, dust can still be a problem on windy days when the milk room lies in the path of winds blowing over dusty yards. If you're building new dairy premises or altering your layout, you've an opportunity to keep the dust nuisance to a minimum. Consult your local Dairy Officer for details of dairy shed layout.

—*J. ARMITT,*
Dairy Officer.

CULLING, or weeding out the low producers, is a necessary part of dairy farming. It allows the farmer to get rid of the passengers in his herd and to replace them with better cows.

In culling, the milking conditions of all the cows in the herd have to be compared. Incorrect comparisons can easily be made if you fail to consider all the factors that influence yields.

The age, health and management of each cow has to be considered. Footrot, mastitis, or udder injury can cause low yields. The length of time between calvings and the length of the dry period also affect a cow's performance. When the period between calvings is less than 12 months, production during the following lactation is lowered. For reliable culling, keep dependable records to help you judge each cow on her merits.

—*J. SMITH,*
Dairy Adviser.

THE milk vat is an easily cleaned piece of dairy equipment, but this doesn't mean that it should be misued. Evidence of misuse is often found when milk vats are examined.

The tinning will be scratched if buckets of water are stood in the vat. It's unwise to mix milking machine detergents by pouring acid or detergent solutions into buckets of water standing in the vat. This leaves room for acid or detergent to splash onto the vat and commence corrosion. After normal washing, the vat should be rinsed thoroughly to remove all traces of these cleaners. Remember also, that the milk vat isn't a wash-up trough. Always provide and use a separate, galvanised iron wash-up trough.

—*J. D. ELRINGTON,*
Senior Dairy Machinery Adviser.

Plans For July

Commence training heifers to ensure good milk let-down.
Tattoo calves for future identification.
Control grazing on weed-infested paddocks to minimize milk taints.
Check the mechanical efficiency of milking equipment.
Change the separator oil and renew the vacuum pump oil wicks.
Check calves for worms.

Dairyman Fed Silage And Showed Clear Profit

By I. H. RAYNER,
Cattle Husbandry Branch.

Within this article lies the answer to the dairyman's oft-repeated question, "Would it pay me to feed silage to my cows?"

DURING the latter part of 1958, Mr. P. J. Cosgrove continued to deliver more milk than ever before from his farm at Pilton, on the eastern Darling Downs—while production on similar farms declined.

Over the year, he made an additional clear profit of almost £200 by feeding sorghum and cowpea silage to his herd.

In addition, Mr. Cosgrove's cows were kept in good condition to continue their lactations. While some of the benefit from having the cows in good heart was obtained in January, there was little doubt that they would continue to milk better for many months.

An important point is that the cost of this silage was high because the yield was low. It costs no more to prepare and plant land for a good crop than a bad one. The same charge spread over a heavier crop will, of course, give a lower cost per ton.

Mr. Cosgrove's yield, due to the poor season, was a little over 5 tons per acre. In a normal year more than double this quantity is the rule.

How Mr. Cosgrove got the answer to the question of silage costs may be readily seen from Table 1.

The rainfall figures in the first column of the table account for the general district decline in production. The figures for July and October do not give a true picture. In both cases, little feed was obtained because of the lack of follow-up rain combined with warm, windy weather.

Column 2 shows the production trend of four farms which were similar to that of Mr. Cosgrove. Their herd and feeding standards were similar to his, except that they did not feed silage. The figures give production for each month as a percentage of the June production. Production would undoubtedly have fallen further were it not for the greater than usual number of cows calving during the period.

Column 3 gives Mr. Cosgrove's actual production.

Column 4 gives the production which would have been obtained if the same trend had occurred as on the other farms. Mr. Cosgrove considers that his production, without silage, would have been lower than this as he was particularly short of grazing.

Column 5 shows the difference in production due to feeding silage. (Feeding commenced on August 3). It is interesting to note that actual production for July (when no silage was fed) was almost the same as the calculated figures (just 4 gal. less).

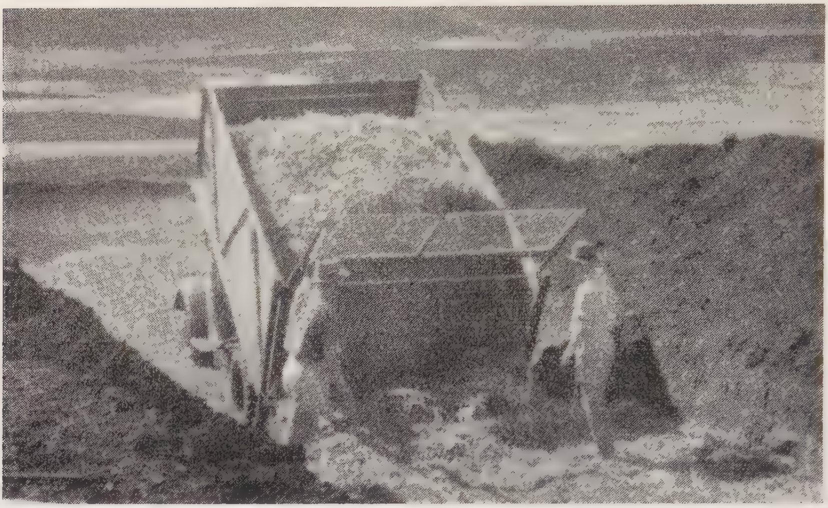


Plate 1.

Filling the Trench.

Column 6 shows the return from the extra production. Although feeding ended on December 13, Mr. Cosgrove's advantage over the comparable farms was greatest in January. All farmers who have fed their cows through a dry time know that much of the benefit is obtained when the herd again has plentiful green feed. This is readily explained by the difference between cows which have been kept in good condition and milking fairly well, and those whose condition and production have fallen away.

TABLE 1.

—	(1) Rainfall.	(2) Production Trend of Comparable Farms.	(3) Mr. Cosgrove's Actual Production (gal.).	(4) Mr. Cosgrove's Production Calculated on Trend. (gal.).	(5) Extra Production (gal.).	(6) Value.		
						£	s.	d.
January, 1958	317	..	..	..	..		..	
February ..	274	..	..	..	..		..	
March ..	335	..	..	..	..		..	
April ..	75	..	..	..	..		..	
May	—	..	..	..	..		..	
June	—	100	1,532·5	1,532·5	0		..	
July	312	104	1,589·8	1,593·8	−4·0		..	
August ..	20	89·6	1,661·9	1,373·1	+288·8	35	1	0
September ..	75	91·3	2,099·1	1,399·2	+699·9	83	5	0
October ..	334	99·7	2,182·1	1,527·9	+654·2	75	4	0
November ..	20	94·4	2,065·6	1,446·7	+618·9	72	14	0
December ..	420	102·8	2,206·2	1,575·4	+630·8	71	5	0
January, 1959	..	112·8	2,913·3	1,728·7	+1,184·6	126	3	0
			Total Extra Return			463	12	0

How Return was Calculated.

To obtain the trend from comparable farms the monthly production of each of four farms was worked out as a percentage of the June production. The percentages for the four farms were then averaged as follows:—

TABLE 2.

Farmers.	A.	B.	C.	D.
June production (gal.)	1,464·8	1,262·8	1,231·4	789·5
September production (gal.)	1,398·6	1,148·4	1,143·9	679·6
September production as % of June . .	95·5	90·9	92·9	86·1
	Average : 91·3%			

Mr. Cosgrove's calculated production (Column 4 in Table 1) was obtained by multiplying his actual June production by the percentage for each month from column 2, for example during September production from "other farms" was only 91.3 per cent. of their June figure.

Thus Mr. Cosgrove's calculated figure for September was 91.3 per cent. of his June production, that is,

$$\frac{1{,}532.5 \times 91.3}{100} = 1{,}392.2 \text{ gal.}$$

In fact, if Mr. Cosgrove's herd had been fed in the same way as those on similar farms his production would only have been the amounts shown in column 4.

An average of 40 head—36 milkers and 4 dry stock—were fed silage from August 3 to December 13. At each feed, about half a ton of silage was

Plate 2.

The Trench Silage is Covered with Earth by Mechanical Means.

Plate 3.

Cutting Out a "Bench" of Silage.

Plate 4.

Silage is Forked on to the Truck.

put out for the herd. Thus on twice daily feeding the cows received an average of 56 lb. silage per head per day, while the once daily feed gave them 28 lb. per head.

Feeding was carried out as follows:—

August 3 to 20—once daily.

August 21 to October 14—twice daily.

October 15 to November 10—once daily.

November 10 to December 13—twice daily.

From October 15 to November 10 only one feed daily was given as some crop feed was available following the October rain.

THE COST OF SILAGE.

The figure of £463 gross profit is of no value to the practical farmer unless he knows how much the silage cost. Only a net profit will increase his bank balance. In this case the cost was entirely made up in producing and feeding out the silage. There is little extra expense in milking cows producing 3 gal. a day rather than 2.

Mr. Cosgrove's total costs in producing approximately 112 tons of silage from 22 acres were as follows:—

Allowance for Use of Land.

If this paddock had been used to grow grain sorghum for sale, a net profit of £4 an acre may have been obtained during this particular season. £4 per acre was thus the cost of using it instead to produce sweet sorghum for silage. Therefore, the total "hire" of land was £88.

Land Preparation.

The paddock was worked with a chisel plough twice (during September and October, 1957) and scarified twice (during November and December, 1957). The chisel plough fitted with sweeps was used as a scarifier.

	£	s.	d.
Chisel plough scarifier repairs, interest and depreciation	9	11	3
Tractor repairs, interest and depreciation	20	12	5
Fuel, oil and grease	8	0	0
	£38	3	8

Farmer's own labour, 30 hours.

Planting.

Sugardrip sweet sorghum and Christaudo peas were planted on February 12 and 14, 1958, following one inch of rain.

	£	s.	d.
Seed	24	0	0
Combine repairs, interest and depreciation	2	17	3
Tractor repairs, interest and depreciation	5	3	0
Fuel, oil and grease ..	2	16	7
	£34	16	10

Farmer's own labour, 11 hours.

Harvesting.

The crop was harvested with a flail type forage harvester at the end of May, 1958. Two extra men were employed—one to drive the tractor, while Mr. Cosgrove handled the truck, and another to spread and roll the silage, and look after the dairy herd.

	£	s.	d.
Forage harvester repairs, interest, depreciation ..	32	8	0
Truck registration, repairs, interest, depreciation ..	9	16	7
Tractor repairs, interest, depreciation	5	3	0
Fuel, oil and grease ..	15	6	8
Hired labour (2 men for 30 hours)	22	10	0
	£85	4	3

Farmer's own labour, 30 hours.

Trench.

The trench was excavated by a contractor for £19 6s. 8d. This cost can reasonably be spread over five fillings.

Thus the cost in this case is £3 18s.

Plate 5.

Feeding Out to the Herd.

Covering.

A ditcher was used to spread a soil cover over the silage. One man was employed on the ditcher.

	£	s.	d.
Ditcher repairs, interest, depreciation	1	12	0
Tractor repairs, interest, depreciation	2	6	10
Fuel, oil and grease ..	1	11	5
Hired labour (1 man for 5 hours)	1	17	6
	£7	7	9

Farmer's own labour, 5 hours.

Feeding Out.

The task of removing the silage from the trench—often dreaded by farmers considering the use of silage—proved very easy in this case. A light dozer blade on a wheel tractor was used to push the soil cover off in strips across the trench. One blade width (7 ft. wide) was sufficient for 2 weeks' feeding. The few inches of rotted material on top of the silage prevented loss of feed value after the soil cover was removed. The silage was then simply cut in 2 ft. wide strips across the trench with a hay knife, and forked onto a truck. The truck was driven out into the paddock, where the silage was forked off in small heaps. Approximately half an hour each two weeks was taken to remove the soil cover. Feeding out—cutting, loading, and distributing the silage—took less than half an hour for each half ton load. When dry weather prevents normal farming operations, farmers can usually spare this time to feed their cows.

	£	s.	d.
Tractor repairs, interest, depreciation	2	6	10
Dozer blade repairs, interest, depreciation	3	16	0
Truck repairs, interest, depreciation and registration	2	10	0
Fuel, oil and grease	3	0	0
	£11	12	10

Farmer's own labour, 110 hours (spread over 4 months).

Total cost .. .. £269 3s. 4d.

Total own labour .. 186 hours.

The total cost deducted from the gross return of £463 12s. 0d. leaves a handsome profit of £194 8s. 8d.

This return of £194 would not be worthwhile if it did not more than compensate Mr. Cosgrove for his labour. Obviously his 186 hours' work was well paid for, with a good margin left over.

Mr. Cosgrove's experience was exceptional only because it was possible to obtain production costs, together with a reasonable assessment of returns. Many other farmers have reaped similar benefits from silage.

Mr. Cosgrove is putting down a further 500 tons of silage at present. Many others are replenishing or building up reserves.

They know that silage in the ground will return better interest than money in the bank.

Super for Winter Pastures

Dairy farmers should be attending to the nutritional requirements of their winter pastures. Superphosphate applied following the first good rains in late autumn-early winter will stimulate the perennial legumes and will assist seedling clover development.

Clover pastures fertilized with 2 to 3 cwt. of super to the acre in early winter will be ready to produce more pasture for dairy cattle in August and September.

—*A. Hegarty, Agrostologist.*

Dairymen Might Profit From These Winter Pastures—Part II.

By C. A. SCHRODER, Assistant Irrigationist.

This article describes the establishment and management of the irrigated annual winter type pastures discussed in last month's issue.

The following points should be noted particularly:—

(1) Irrigated annual type winter pastures can be expected to supply heavy quantities of attractive highly nutritious pasturage from mid-May to mid-October. One acre of such pasture, well managed, should when used as a protein supplement maintain six to seven cows in good production throughout the autumn-winter-spring period.

(2) Cool weather growth rates exceed that of perennial species, and irrigation requirements are low.

(3) Irrigation is essential to success.

(4) Effective nodulation of legumes must be obtained soon after germination.

(5) Management in the first year must be designed to obtain good seeding down.

(6) Reduction of stubble is necessary in January-February to obtain good re-establishment. This may be effected by low grazing or mowing.

(7) If there is very heavy density of summer volunteer cover, reduction by tine cultivation should be carried out every second or third year.

(8) Soil nutrient deficiencies, either of major or minor elements, must be corrected as they occur during the life of the pasture. The maintenance of a desirable amount of clover in the mixture should be the method employed to supply the grass with nitrogen.

(9) Good grazing management must always be practised.

(10) There seems to be good possibilities of utilizing the annual winter pasture land for producing certain summer crops.

In the first year of experiments along these lines a crop of maize grown for grain returned a satisfactory yield.

The pasture regenerated well by natural means among the maize. The pasture was ready for the grazing at the same date that the maize was ready for harvesting.

Throughout the season this pasture performed quite as well as an adjacent area where the land was not utilized in summer.

Maize or sorghum for silage are other crops which would probably result in good land utilization in summer and fit well into the farm feed conservation programme.

(11) The Lockyer Valley has a wide variation between summer and winter temperatures. Hot summer conditions are normal and enforce

careful management and strict attention to irrigation for the successful persistence of perennial temperate pastures based on White clover.

Crops such as maize, sorghum, lucerne, and sudan grass and grasses like paspalum and green panic do well in summer. A hazard with them is that though rainfall is predominantly of summer incidence it is unreliable. Supplemental irrigation is normally necessary to ensure sufficient moisture for reliable production.

The combination of pasture in the autumn-winter-spring period and a summer crop in the spring-summer period if it can be successfully adapted has many good points. The annual winter pasture species give better production in the winter season of growth than do the perennials. On the other hand the natural summer crops are less vulnerable in summer and make better use of the high temperatures and long days than do temperate species. Winter growing pastures are good for utilizing harvested water before the heat of the following summer. Evaporation loss from storage dams is less heavy in the autumn-spring period.

Shortage of water in summer periods due to irrigation restrictions or other reasons will have less drastic results with the deeper rooted crops like maize than with summer clover pastures.

It is not suggested that perennial pasture areas be reduced. It is advisable, however, to plan carefully the most economic use of land, irrigation water and labour on a long-term basis.

(12) Under normal average conditions on the Gatton Regional Experiment Station a programme similar to that outlined in (11) would require 12 in. per acre of irrigation per season for the pasture, and 2½ in. per acre to supplement rainfall in the summer silage crop should soil moisture stress occur.

Pasture Mixtures

Pasture mixtures are made up of suitable clovers and grasses. Two strains of subterranean clover have been very successful on the Gatton Regional Experiment Station. These are Yarloop and Clare strains.

Both are early growers and vigorous producers and under the conditions at the station they have shown themselves superior to mid-season and late strains. Yarloop has marked ability to produce under wet soil conditions and has been better than Clare in locations where drainage is slow.

It is essential to obtain good nodulation of the clover as quickly as possible after germination. Good results will not be obtained otherwise. Inoculation with a suitable strain of nitrogen-fixing bacteria should be done carefully at planting. Suitable inoculum is available free from the Department of Agriculture and Stock and the instructions issued with each package should be followed closely.

In inoculation trials carried out on the Station, quite satisfactory nodulation has always been easily obtained with Clare strain. Yarloop has required more careful handling but has always responded if the instructions given are carefully followed.

Wimmera rye grass has performed well on the station. It is very easy to establish and does not require a well-prepared seed bed. For this reason it establishes easily in stubble.

It is a very fast grower, very acceptable to stock, and of high food value if not allowed to become old before grazing. Seed is produced freely in October-November. It germinates well.

The Gatton strain of this grass has performed particularly well on the station in the grazing trial carried out last season. The seed for this trial was increased from a few heads obtained from material that had regenerated well in the Rockhampton district.

The annual type prairie grass has been tried on the station with somewhat less success than that obtained with wimmera rye grass.

Priebe's perennial prairie grass seems to hold promise and is under trial. On the station it produces its best growth in autumn and spring. Winter growth rates are less than for wimmera rye. It is capable of re-establishing quite well in autumn from its own seed.

The inclusion of half a pound of lucerne seed to the acre is often worthwhile. This will make some growth after irrigation has ceased in October, and will provide a small amount of summer grazing.

In this way some use is made of any subsoil moisture resulting from the irrigation season as well as any rain that occurs.

Planting

The pasture should be planted into well-prepared land at the end of March or very early in April. When this is done, good grazing is usually available soon after the middle of May. A successful stand can even be obtained by planting any time in May, but a much lighter amount of grazing will be obtained in the first year when this is done.

The seeding mixture recommended is:

	per acre.
Wimmera rye grass	4 lb.
Clare strain subterranean clover	4 lb.
Yarloop strain subterranean clover	4 lb.

If desired, 8 oz. of lucerne per acre may also be included.

Plate 4.

Dense Re-Growth of Louisiana White Clover on 5-5-58. This pasture was un-irrigated from 31-10-57 to 7-5-58. This is the second grazing for the season, the first was ready on 19-3-58. No summer cropping programme was carried out in this area. The pasture was originally planted on 3-4-57.

Plate 5.

Land Utilization in Summer. The annual pastures are cultivated for crops—in these experimental plots maize sown in January.

If the soil is well drained, Yarloop can be omitted and extra Clare included. Where drainage is poor or the soil very heavy, it is better to omit Clare and double the amount of Yarloop.

Louisiana Strain White Clover

Trials with Louisiana White Clover strain were commenced on the station in 1957. These were referred to in Part I of this article. Several more years of experimental work are necessary before any definite recommendations can be made. The results of the first year's work, however, are most promising.

This clover is really a perennial grower. Under a full irrigation programme it will persist indefinitely, and provide good seasonal grazing throughout the whole year. However it has some excellent characteristics which recommend that it be tried as an annual winter pasture to provide grazing in the vulnerable May to October period. Irrigation would be withheld at the end of October. In this way it may serve as an alternative to the true annual subterranean clover. Perhaps in some areas it may prove superior.

Louisiana is notable for its very free seeding habit. Seed setting commences early in spring and continues throughout the growing period of the plant. The seed produced is very viable. If the parent crop dies there is an abundance of good seed at the soil surface for re-establishment of the stand when conditions become suitable.

Unirrigated Louisiana has also proved itself capable of withstanding long periods of dry hot weather without dying out.

Indications from the first year of the trials are that, if irrigation is not applied after the end of October, Louisiana though unproductive, may remain alive and then commence regrowth from old runners present in the mulch cover about the end of January. When this occurs, quite good grazing can be expected from the end of March onwards. However, it would be essential to retain sufficient pasture or mulch cover throughout summer to prevent extremely high soil temperatures which the runners could not tolerate (Grazing bare to ground level would be fatal). With this method Louisiana would provide earlier grazing than subterranean. The latter would provide faster growth and more grazing in the cold months. See Plate 4.

If death of the clover occurs in summer, the pasture can be expected to re-establish itself from seed in the same way as subterranean. Indications are that in these circumstances the first grazing of the season would be available much earlier from subterranean than Louisiana.

Thus there are prospects of using Louisiana white both as a winter seasonal pasture (irrigated as necessary during autumn to spring, unirrigated in summer), and as a true, annual, self-regenerating pasture, treating it in the same way as subterranean clover.

It appears likely that Louisiana can tolerate less shading at regeneration time than can subterranean. This may prove a limiting factor when the full subject of land utilization is considered. (This is referred to later.)

Some care is required concerning the use of clovers. Mixing of perennial and annual strains of clover almost invariably has one result. The perennial, whether used as an annual or seasonal producer, will encroach under the influence of rainfall in the

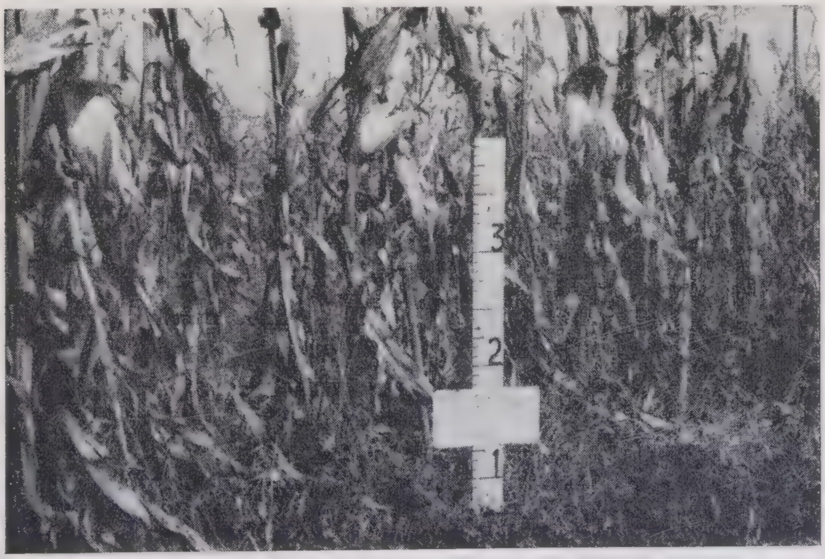


Plate 6.

Successful Pasture Regeneration Ready for Grazing in the Summer Maize (14-5-58).
Original sowing of pasture was 3-7-56.

period between death and regeneration of the annual. In a few years the perennial strain will take control to the detriment of the pasture.

The same result will happen at a slower rate, because of transfer of seed, if perennial and annual clovers are grazed simultaneously.

Usually if the amount of white clover by invasion becomes too great it can be controlled satisfactorily by ploughing or tine cultivation when the annual clover is dormant.

Any soil nutrient deficiences should be corrected by the application of suitable fertilizers before planting.

On the fertile alluvial soils of the Lockyer Valley, fertilizer treatment is generally not required. However, sulphur sometimes becomes deficient in the soil after a couple of years under irrigated pasture. Any deficiency will need to be remedied as it occurs.

The particular needs of the soil type in use must always be kept in mind.

Pasture Management

The first year should be regarded largely as a period of pasture development although good grazing can be obtained at the same time.

Where soil fertility conditions are good, the rye grass will make remarkably quick growth following germination. This results in control of weeds and allows an early grazing return to be obtained by the farmer.

However, this ability to make such fast early growth also carries an element of danger. If sown too heavily and allowed to grow too freely the grass will smother the clover seedlings and prevent them from developing.

It is essential to develop a good stand of clover at an early date. The pasture should be at least 30 per cent. clover by the middle of September and finally increasing to 60-70 per cent. If this is not achieved, the wimmera rye grass will ultimately suffer nitrogen deficiency and make poor growth while clover growth will also be poor and seeding down will not be satisfactory. Thus only a poor stand can be expected in the second year.

Development of the clover can be favoured by curtailing grass growth either by grazing or mowing. As clover cannot grow if shaded, this treatment will allow the clover the necessary light for satisfactory development.

On highly fertile land it may be necessary to reduce the seeding rate of the grass. This is because of the high growth rate on such land, and particularly when planting is carried out in early April as this time of planting results in particularly rapid grass development.

Where planting is done into poor soil, little grass growth will occur until such time as the clover influence and the return of dung and urine by the grazing animals raise the soil fertility level. In this circumstance, the pasture will be heavily dominated by clover for one or even more years.

Grazing should be carried out intermittently, preferably by using the electric fence as described earlier. The grazing programme should be so arranged that the pasture is always grazed at a succulent stage. However, spell periods should be as long as possible, compatible with the maintenance of high food value and development of desirable grass-clover ratio.

Good seeding-down of all species is essential in the first year. This can be obtained by removal of stock from the time of flowering to seed ripening.

Grazing can be resumed after this has been achieved.

Subsequent Years

In seasons subsequent to the year of planting, re-establishment of the pasture occurs naturally. No land preparation is required. Germination and establishment will occur unaided when weather conditions become suitable.

In this way production costs are cheaper than for crops like oats which require ploughing and complete seed bed preparation for every crop.

Natural regeneration results in an earlier stand than is obtained from planting in a prepared seed bed. This is because the existing stubble shades the soil surface, reducing soil temperatures and surface evaporation rates.

Regeneration is aided by the removal of any volunteer cover of summer-growing weeds. This can normally be done by grazing or low mowing. A satisfactory time is early to mid-February. After a number of years, the summer cover may become so dense and vigorous that some tine cultivation may be desirable. Such a condition however is most unlikely to be an annual one.

If heavy seeding-down is obtained in the year of planting, management in subsequent years will be simplified.

Germination among stubble is governed by temperature and moisture and light.

Cool, cloudy, wet spells occur in some seasons in January and early February. When this happens, germination of seedlings may be too early and many may be killed off by heat, or die when weather conditions return to normal. Good germination of wimmera rye grass has occurred on this station in the first week of January.

Loss of one or more crops of seedlings in this way has so far not prevented the development of a quite

2
N 28-32 IRRIGATED ANNUAL
WINTER PASTURE
PLANTED
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Plate 7.

This Close-Up View Shows More Detail of the Pasture Within the Maize Area of Plate 6.

Plate 8.

The Regenerated Pasture Being Grazed for the Second Time in the Season (20-6-58). Note the old maize stalks in the background.

satisfactory final stand of pasture being present every year.

In 1954 two bays of pasture, originally planted in 1952, were rotary-hoed out in both February and March. Even with removal of all seedlings in this way, there was still a good final stand of pasture from later germination.

If germination occurs in January it is not worth endeavouring to maintain the seedlings. February germination amongst stubble, particularly if it occurs towards the middle of the month, is usually worth saving even if an irrigation is required.

February-March Best

However, late February-early March is the most desirable time for regeneration, and plants germinating in these periods can normally be kept without difficulty.

The newly regenerated stand will benefit from mowing if much weed growth occurs.

Grazing

The general principles of management will be the same as for the first year. A fairly common feature after the first year is that the grass is less vigorous, especially in the early part of the season, than it was following the original planting. This is influenced by the extent of volunteer non-legume growth in summer as a result of rainfall. The reduced grass vigour in the pasture means less shading of the clover. In this new environment the young clover makes rapid headway.

At the time of the first grazing for the season, the pasture is usually very clover dominant. Though the grass seedlings make little early growth and provide only a small amount of early grazing they do not die. Conditions for grass growth rapidly improve, under the influence of the clover and the animal return. It usually happens that by the third time of grazing the grass is healthy and vigorous and contributes a substantial amount to the grazing available.

Clover dominance will not cause grazing problems where the pasture is utilized as a protein supplement. Where full-time grazing is required, grazing in narrow strips to force the stock to eat down and utilize portion of the leaf stalks has been practised on the station.

There has been no occurrence of bloat up to the present time.

Removal of stock is necessary for a period when the clover is seeding. This ensures a plentiful supply of seed for the following season.

Farmers are particularly reminded of the dangers of over-grazing which are discussed under the earlier section "Method of Grazing".

The pasture lends itself well to the making of good quality hay. Cut at the right stage it produces soft, palatable hay of high nutritive value.

High Nutritive Value

Also, nutritive value of the pasture is very high when grazed at the correct stage. It should be allowed to develop well before grazing, but stock should be introduced while it is still in a succulent condition and before the grass sends up flowering heads.

If flowering of the grass occurs, the pasture is reduced in food value and will mature and cease growth too early in the season. The length of the grazing season will be prolonged by preventing this flowering.

A well-balanced pasture containing about 60-65 per cent. clover and 35-40 per cent. grass, grown in fertile soil and grazed, after about four weeks' spell will contain from 20 to 25 per cent. of protein on a dry matter basis.

Three to four years under pasture confers a considerable benefit on the soil. The soil is improved both chemically and physically and following crops show marked improvement.

Irrigation

Irrigation to supplement rainfall is essential for the successful growth of the pastures. Since growth occurs during the cooler months of the year, the demand for water is lower than with summer-grown pastures. The actual amount of irrigation needed will vary with the season.

The average requirement on the station is 12 in. each season, usually applied in six irrigations of about 2 in. each application. The amount to be applied at an irrigation will depend on the type of soil and the amount of moisture present.

The soil should be wet to the full depth of the root zone. Wetting the top few inches is of practically no benefit and costs time and money.

A few minutes probing the soil with a 1 in. auger is time well spent. By this means, the time to water can be gauged accurately and then, after watering, a few holes will indicate how deeply the irrigation has penetrated and whether too much or too little water has been applied.

The amount of irrigation necessary is usually about 2 in. per application.

No irrigation is applied during the dormant period which is about October to mid-February.

Suitable rains for regeneration usually occur during mid-February to mid-March and the first irrigation is normally applied when the pasture requires it after that period.

Farming practices in the Lockyer Valley make a heavy demand on irrigation in spring and summer, with much reduced demand in autumn and practically none in winter.

Thus the growing of irrigated winter pasture fits well into the farm programme from the irrigation viewpoint.

Plate 9.

A Closer View of the Pasture Shown in Plate 8.

Use of Land in Summer

The pasture occupies the soil only from approximataely mid-February to the end of October after which the seed ripens very quickly, particularly when early flowering types are used.

This means that the land is not highly productive in the remainder of the year. Until recently the only utilization in this period has been from growth of volunteer summer plants or the small amount of lucerne included.

It is to be remembered, of course, that land used for oat-grazing crops is normally fallowed in summer.

Any plan that would give a good return from the land in this summer period would be of quite considerable economic value to the farmer.

Experiments were commenced on the station in 1957 in the growing of a summer crop of maize following the decline of the annual winter pasture. First year results are very encouraging.

Following the seeding down and drying off of an area of subterranean clover—wimmera rye grass pasture at the end of October 1957, the area was grazed fairly hard to reduce the amount of stubble. The stubble provided quite satisfactory grazing for dry cattle and sheep.

The area was chisel-ploughed and tine-cultivated in November as preparation for sowing to the maize. Irrigation check banks were not cultivated. The chiselling and tining did not interfere with land levels. As a result, the efficiency of surface irrigation in the 1958 pasture was not reduced.

Where irrigation is by spray methods, shallow ploughing with disc or mouldboard as an alternative to chiselling would be quite satisfactory.

Hybrid maize was planted on January 6, 1958. December planting was planned but was not possible under the existing drought conditions. In the absence of rain, one irrigation was given immediately after planting.

Good rainfall was received in late January and throughout February, March and April. The maize required only the irrigation given at planting.

Row widths of maize were increased to 6 ft. and the plant spacings within the rows reduced to maintain near-average population rates. The wider rows were used to afford plenty of light for the regenerating pastures.

Pasture Phase Helped Maize

The maize crop received benefit from the pasture in two ways:

(*a*) The pasture phase improved both the soil structure and the soil fertility. This meant a better soil environment for the maize.

(*b*) Irrigation of the pasture in winter and spring 1957 provided a reserve of subsoil moisture which the maize utilized.

The resultant maize crop was harvested on May 14, 1958. A yield of 53.6 bushels of grain to the acre was obtained. This is not high though it is about double the State average. Better yields will probably result when the rows are planted closer in later trials.

Maize production for silage as an alternative to grain is to be included in the 1958 summer land utilization trials. Such a project combines well with annual winter pastures. The maize silage would take a valuable part in the overall fodder conservation plan so necessary on any Queensland dairy farm. By reason of its earlier time of harvest, maize for silage will compete with the pasture for a shorter period than maize for grain.

The irrigation facilities used for the pasture are available for the irrigation of the summer crop should such practice become necessary.

Maize Helped the Pasture

When the land utilization programme was being considered, it was a matter of conjecture whether or not the pasture would regenerate satisfactorily among the maize. There seemed a possibility that the tall maize would intercept too much light and that satisfactory germination and early growth of the pasture may not occur until the maize crop approached maturity and commenced to thin out.

In actual practice the presence of the maize crop appeared to assist pasture re-establishment. The wide row spacing allowed a late cultivation. This kept down weeds and provided a good seed bed for the pasture components.

Under existing rainfall, the subterranean clover and wimmera rye germinated in February. The young seedlings benefited from the light shading effect of the maize.

In this environment the clover developed rapidly. See plates 6 and 7.

The clover was ready for grazing at April 30, 1958. Only a small amount of weed was present, chiefly wild millet. At this date the maize grain was not quite ready for harvest. Stock were introduced after the maize was harvested.

Comparisons

The pasture in the maize area was equal in every way to the regenerated pasture in an adjacent area that was not utilized for any summer cropping. This equality lasted throughout the season.

Plate 10.

Centre and Right Show (19-9-58) the Same Pasture as Plates 6-9. Here it is ready for the fourth good grazing of the season. The pasture was also grazed in the last weeks in August and October. Note that the old maize stalks have disappeared.

Five good grazings were obtained by late October. Thus the pasture itself maintained its usefulness as a means of helping to overcome the May to October grazing problem.

The old maize stalks broke down quickly. They proved no hindrance to grazing. Indications are that in all seasons they will have broken down completely before further chisel-ploughing is due.

No irrigation was required until May 23, 1958.

In an area of Louisiana strain of white clover treated similarly to the foregoing the yield of maize grain was 63 bus. to the acre. This was considerably better than following the subterranean clover in the same year of trial.

Louisiana clover did not germinate and grow until the maize was harvested and the old stalks removed. Grazing was not provided until September. In this way the clover contributed nothing to the autumn and winter grazing problem.

Further Trials

Continuation of summer land utilization trials is planned. They are being widened to include maize population trials and maize silage trials. The growing of sorghum for silage will also be included.

With the failure of Louisiana white to regenerate in land chisel-ploughed and sown to maize, it is intended to try direct sod-seeding of maize into Louisiana. In this method the clover runners may persist through summer and regrow in autumn. Establishment of maize by sod-seeding may not be successful in the heavy soils of the station.

Plate 1.
Cattle Pumpkins in the Tent Hill District.

Pumpkins, A Double-Barrelled Crop

By J. G. FULLERTON, Adviser in Agriculture.

SOME of the advantages of pumpkins as a crop for dairy farmers are:

They can be sold as a cash crop, or used as stock feed on the farm.

No specialised machinery is required for their cultivation.

They can be stored for about 4 months in the winter.

Good roughage for grazing is available in the paddock after harvesting.

For dairy farmers, table pumpkins can be regarded as a double-barrelled crop. When prices are attractive and markets available, they can be sold as a cash crop. Failing this, their value as a food for stock, particularly cows and pigs, is well recognised.

The practice of growing pumpkins, and then using them as markets and

Plate 2.

Crop of Maize and Pumpkins, Norton Vale.

seasons dictate, is a well-established one on dairy farms in the Lockyer Valley.

An area planted to pumpkins is not an area lost to fodder crops for the dairy herd. After the crop has been harvested, useful grazing can be obtained from the summer grasses and better weeds which grow during the stage when cultivation of the crop is no longer practicable. However, due to the risk of tainting milk from grazing of this nature, it should be used with caution, or better still, for dry stock only.

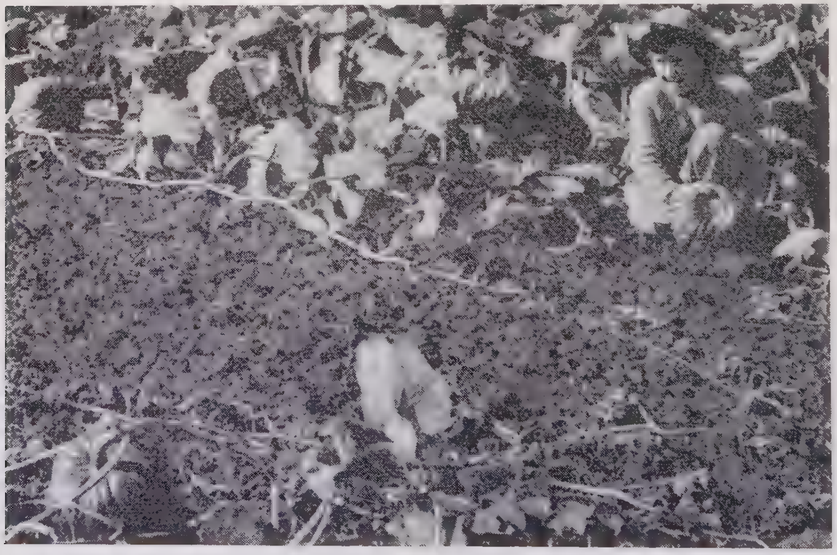

Plate 3.

A Crop of Irrigated Pumpkins Nearing Maturity in the Tent Hill District.

A further advantage to the dairy farmer is that no specialised machinery is required for pumpkin cultivation. Implements already on the farm for the growing of fodder crops can be used.

Planting.

For planting, a maize planter can be used, but a method commonly adopted is for a man to sit on a set of tandem disc harrows, and drop the seed in front of the implement. Seeds are immediately covered, with the minimum loss of soil moisture.

With this method of planting, a spacing between seeds of about 18-24 in. is usually adopted. This allows for thinning out if necessary, and also ensures that an adequate stand is obtained.

Pumpkin crops are very frost-susceptible, and except for frost-free areas, planting is confined to the August-January period. On frost-free areas, plantings can be made as early as June, although some form of pre-germination of seed is usually required for such plantings.

Late plantings, which are harvested in late autumn or early winter, can be stored over the winter months. During this period, pumpkins can be stored for 3 to 4 months, but during the hotter period of the year, they will not store very satisfactorily.

On well-prepared land, with favourable rainfall or supplementary irrigation, yields in the vicinity of 6 to 8 tons of pumpkins an acre can be obtained. Even under adverse growing conditions, if cultivation of the crop has been good, yields seldom fall below 2 tons an acre.

Plate 4.

Pumpkins Harvested After the Vines had been Depressed by Frost in the Forest Hill District.

Brucellosis-Tested Swine Herds.

(As at 1st June, 1959.)

Berkshire.

S. Cochrane, "Stanroy" Stud, Felton
J. L. Handley, "Meadow Vale" Stud, Lockyer
O'Brien and Hickey, "Kildurham" Stud, Jandowae East
G. C. Traves, "Wynwood" Stud, Oakey
Westbrook Farm Home for Boys, Westbrook
H.M. State Farm, "Palen" Stud, Palen Creek
A. R. Ludwig and Sons, "Beau View" Stud, Beaudesert
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
R. H. Crawley, "Rockthorpe" Stud, *via* Pittsworth
F. R. J. Cook, Middle Creek, Pomona
Mrs. I. M. James, "Kenmore" Stud, Cambooya
H. L. Stark, "Florida," Kalbar
H.M. State Farm, Numinbah
G. L. Gabanko and R. H. Atkins, "Diamond Valley" Stud, Mooloolah
L. Puschmann, "Tayfield" Stud, Taylor
C. E. Edwards, "Spring Valley" Stud, Kingaroy
V. F. Weier, "La Crescent," Clifton
N. Rosenberger, "Nevrose," Wyreema
L. P. Orange, "Hillview," Flagstone Creek
W. Young, Kybong, via Gympie
E. J. Clarke, Mt. Alford, *via* Boonah
G. McLennan, "Murcott" Stud, Willowvale
C. F. W. and B. A. Shellback, "Redvilla" Stud, Kingaroy
J. C. Lees, "Bridge View" Stud, Yandina
F. Thomas, "Rosevale" Stud, M.S. 373, Beaudesert
A. C. Fletcher, "Myola" Stud, Jimbour
Q.A.H.S. and College, Lawes
E. F. Smythe, "Grandmere" Stud, Manyung, Murgon
E. R. Kimber, Block 11, Mundubbera
A. J. Potter, "Woodlands," Inglewood
Regional Experiment Station, Hermitage
R. Astbury, "Rangvilla," Pechey
L. Pick, Mulgildie
D. G. Grayson, Killarney
A. French, "Wilson Park," Pittsworth
P. F. Pfrunder, Pozieres
A. Wolski, "Carramana," Warra.

Large White.

H. J. Franke and Sons, "Delvue" Stud, Cawdor
Garrawin Stud Farm Pty. Ltd., 657 Sandgate road, Clayfield
J. A. Heading, "Highfields," Murgon
R. Postle, "Yarralla" Stud, Pittsworth
E. J. Bell, "Dorne" Stud, Chinchilla
L. C. Lobegeiger, "Bremer Valley" Stud Moorang, *via* Rosewood.
H. R. Gibson, "Thistleton" Stud, Maleny
H.M. State Farm, Numinbah
S. T. Fowler, "Kenstan" Stud, Pittsworth
W. Zahnow, Rosevale, *via* Rosewood
Regional Experiment Station, Biloela
G. J. Hutton, "Grajea" Stud, Cabarlah
H. L. Larsen, "Oakway," Kingaroy
A. Palmer, "Remlap," Greenmount
G. I. Skyring, "Bellwood" Stud, *via* Pomona
G. Pampling, Watch Box road, Goomeri
M. Hall, "Milena" Stud, D'Aguilar
K. B. Jones, "Cefn" Stud, Pilton road, Clifton
Barron Bros., "Chiltern Hill," Cooyar
K. F. Sturmer, French's Creek, Boonah
Q.A.H.S. and College, Lawes
R. S. Powell, "Kybong" Stud, Kybong, *via* Gympie
C. Wharton, "Central Burnett" Stud, Gayndah
S. Jensen, Rosevale, *via* Rosewood
V. V. Radel, Coalstoun Lakes
H. R. Stanton, Tansey, *via* Goomeri
L. Stewart, Mulgowie, *via* Laidley
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
O. J. Horton, "Manneum Brae" Stud, Manneum, Kingaroy
Dr. B. J. Butcher and A. J. Parnwell, 684 Logan road, Greenslopes, Brisbane
R. Kennard, Collar Stud, Warwick
A. C. H. Gibbons, Mt. Glorious
A. Kanowski, "Exton," Pechey
L. C. and E. Wieland, Lower Cressbrook
P. L. and M. T. D. Hansen, "Regal" Stud, Oaklands, Rangeville, Toowoomba
J. C. Lees, "Bridge View Stud, Yandina
C. Assenbruck, Mundubbera
A. J. Mack, Mundubbera
J. & S. Kahler, East Nanango
C. P. Duncan, "Hillview," Flagstone Creek

Tamworth.

D. F. L. Skerman, "Waverley" Stud, Kaimkillenbun
A. C. Fletcher, "Myola" Stud, Jimbour
Salvation Army Home for Boys, "Canaan" Stud, Riverview
Department of Agriculture and Stock, Regional Experiment Station, Kairi
T. A. Stephen, "Withcott," Helidon
W. F. Kajewski, "Glenroy" Stud, Glencoe
A. Herbst, "Hillbanside" Stud, Bahr Scrub, *via* Beenleigh
F. Thomas, "Rosevale" Stud, M.S. 373, Beaudesert
H. J. Armstrong, "Alhambra," Crownthorpe, Murgon
R. H. Coller, Tallegalla, *via* Rosewood
D. V. and P. V. Campbell, "Lawn Hill," Lamington
S. Kanowski, "Miecho" Stud, Pinelands
N. R. Potter, "Actonvale" Stud, Wellcamp
L. C. and E. Wieland, Lower Cressbrook
J. D. Booth, Swan Ck., Warwick

Wessex Saddleback.

W. S. Douglas, "Greylight" Stud, Goombungee
C. R. Smith, "Belton Park" Stud, Nara
D. T. Law, "Rossvill" Stud, Trouts road Aspley
J. B. Dunlop, "Kurrawyn" Stud, Acacia road, Kuraby
M. Nielsen, "Cressbrook" Stud, Goomburra
G. J. Cooper, "Cedar Glen" Stud, Yarraman
"Wattledale" Stud, 492 Beenleigh road, Sunnybank
Kruger and Sons, "Greyhurst," Goombungee
A. Scott, "Wanstead" Stud, Grantham
G. C. Burnett, "Rathburnie," Linville
A. J. Mack, Mundubbera
J. Ashwell, "Greenhill," Felton South

Large Black.

E. Pointon, Goomburra

This Pasture Beat Native Grass For Beef Production

By N. E. GOODCHILD,
Senior Adviser in Agriculture.

MEASURED by the production of beef, wool, mutton and dairy products, pasture is Queensland's most important crop. However, in spite of the importance of pastures to the State's economy, only about 2,000,000 acres out of a total area of 430,000,000 acres are sown to improved pastures.

This position is changing as new information on pasture species is brought to light from trials and demonstrations. Nowhere is this happening more rapidly than on the coastal lands of the wet tropics.

Pioneer work with pasture legumes carried out by the Department of Agriculture and Stock at the Bureau of Tropical Agriculture, South Johnstone, demonstrated the value of several vigorous species including centro (*Centrosema pubescens*).

As a result of this work, centro is being widely used in tropical coastal pastures.

Following its successful establishment in trial plots in the Mackay district, centro is now being used, not only on dairy pastures where returns per acre are higher, but also on some beef cattle properties.

An example is found on the property of Mr. T. A. Cook, " Greenmount," Walkerston, near Mackay. Here 30 acres of guinea grass—centro pasture have been laid down under the terms of the Commonwealth Extension Services Grant, to show the advantages of this type of pasture over native grass when used for beef cattle.

Disced and Harrowed

An area of approximately 30 acres of undulating open forest country was chosen on " Greenmount," Walkerston, about 12 miles west of Mackay. The soil is a grey-brown loam overlying a rubbly, clay subsoil at a shallow depth.

The area was first ploughed and harrowed in January, 1956, using a 13-disc cultivator with harrows attached. Heavy rains during the 1956 summer prevented the immediate establishment of the pasture. Cultivation began again in October, 1956. followed by discing and harrowing in January, 1957.

Sod Seed Planter Used

The area was planted in February, 1957. A sod seeder planter was used with the tubes detached so that the seed was dropped directly on to the soil surface. This prevented blockages through seedheads and straw clogging the tubes.

Superphosphate at the rate of 1 bag to the acre was also applied at sowing time. It was dropped directly from the fertilizer box onto the soil surface.

The seed and fertilizer were covered in by dragging a heavy chain and light harrows directly behind the planter.

The mixture used was guinea grass at 4 lb. to the acre and centro at 2 lb. to the acre. The grass and legume seed was mixed first in acre lots and then placed in the seed box. Very even distribution resulted from this technique.

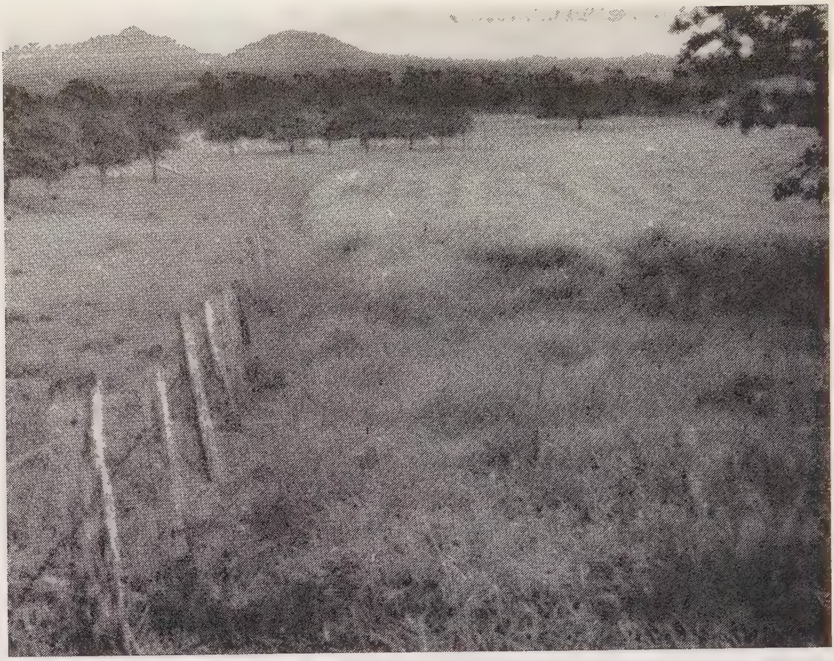

Plate 1.

Guinea Grass—Centro Pasture Produces More Feed than Native Pastures.

Two-Three Years to Mature

Planting was followed by steady rain and a good even germination resulted.

Dry conditions for the rest of the year retarded growth and delayed grazing of the pasture. But, with the onset of rain in January, 1958, rapid growth developed and quick coverage of guinea grass and centro was obtained. By January, 1959, the oldest plants of grass and legume were growing vigorously and self-sown seedlings of guinea grass and centro were filling in the spaces between the stools of grass.

It is obvious that as in other districts this type of pasture takes two or three years to reach full productivity, which is then maintained for a considerable time.

Yield Measured

A number of large enclosures have been erected to protect sections of the sown pasture and of adjoining native pasture from grazing. These enclosures are cut at regular intervals to indicate the amount of forage produced. The yields give also a picture of the seasonal growth pattern.

In general, the pastures make most prolific growth during the December-March period. The rate of growth slows down during April to July and may also be rather slow in August and September, depending on incidence of storms.

The yield from the guinea grass-centro pasture for the 12 months January-December 1958 was 23 tons 7 cwt. of green material to the acre. The native pastures yielded 7 tons 16 cwt.

During the period July to September when the native grasses *made no measurable growth,* the sown pastures produced 1 ton 7 cwt. of green matter to the acre. From September to December, the guinea grass pastures yielded 8 tons 7 cwt. of green matter to the acre, while the native grass produced 3 tons 16 cwt.

The normal carrying capacity of the native pastures is estimated at 1 beast to 6 acres. It is estimated, as the result of intermittent grazing observed on this occasion, that the sown pastures should carry nearly 3 times this number and they will provide feed of much higher protein value owing to the presence of the legume centro in the mixture.

These large differences in favour of the sown pastures have been obtained before the new pastures have reached maximum production. However, the growth pattern which has shown up will determine the method of utilization.

Management and Use

In normal seasons, grazing would begin in April after a January planting. In this instance, dry weather prevented grazing during 1957. The exceptionally heavy rains of February-March, 1958, also prevented regular grazing which would have damaged the soil. However, heavy grazing for short periods was possible and in late March the area was cut back by mowers to a height of 9-12 in. By the end of April, the guinea grass had grown 18 to 20 in. when intermittent grazing was commenced.

The pastures were spelled from June 7-October 5, even though they produced nearly 1½ tons of green weight to the acre while native pasture growth was too small to be measured. From October 5 to November 22 they carried 1 beast to 2 acres.

The December 1958-January 1959 rains and high temperatures accelerated plant growth and in order to

Plate 2.

Centro Growth in Young Guinea Grass Pasture.

prevent rank growth during the wet season the pastures were grazed by 174 head for 6 days.

This reduced grass height from 3 ft. to less than 1 ft. Stock were then removed during the most intense part of the wet season to prevent damage to the soil and pastures. As the pastures "thicken up" their carrying capacity will increase and damage by trampling will become less severe.

Cost of Establishment

Under normal conditions only one ploughing, discing and harrowing would be sufficient for this type of pasture in this district. As mentioned earlier, abnormal seasonal conditions made it necessary to repeat this working.

Costs based on the hiring of machinery and labour and the price of seed and fertilizer are shown:

	£	*s.*	*d.*
Double working (1956 and 1957) using D.2 tractor @ £4 per hour	192	0	0
Cost of seed	78	0	0
Cost of fertilizer	30	0	0
Cost of planting using Ferguson tractor @ £12 per day	30	0	0
Cost of fencing @ £2 10s. per chain (approx. 68 chains)	170	0	0
Cost per acre	16	13	4

In normal seasons when only one working was given this would be reduced by £96 or £3 4s. per acre.

What Does the Owner Think ?

Mr. Cook is so impressed with progress made by this pasture that he has planted a further 80 acres, using only one working, and has developed a plan for further pasture improvement work on the property. In this instance the landholder, who also grows sugar cane, already has the necessary machinery for handling large areas each year.

* * *

Value of Canary Seed as Pig Feed

Canary seed fed to pigs in a recently completed trial at the Hermitage Regional Experiment Station showed the following results:—

(*a*) Up to 40 per cent. of the total ration fed to pigs could be satisfactorily replaced by canary seed.

(*b*) Good growth and a satisfactory food conversion ratio could be obtained. Canary seed has nearly the same food value as other grain.

(*c*) The carcasses had a clean, white fat which was free from any objectionable odour.

(*d*) Flesh development of the carcasses was very good. With all pigs, hams and eye muscle were well filled.

(*e*) Body length of the carcasses was good.

(*f*) Dressing out percentage was very high.

In the trial, one group of pigs was fed 20 per cent. of the total ration as canary seed and a second group was fed at a 40 per cent. level. The 20 per cent. group gave slightly better results because their growth rate, firmness of fat and food conversion ratio were slightly better. It was found advisable to crush the seed before feeding it to pigs.

Pasture and Crop

FIFTEEN bags of barley to the acre from land that produced only 6 bags 8 years ago—that is the change recorded on Mr. A. Free's hillside farm at Cambooya. Back in 1946, when Mr. Free bought the property, uncontrolled runoff had gouged ugly gullies across his cultivation, and yields were declining.

With the assistance of Agriculture Department officers, a soil conservation scheme for the whole farm was developed.

Since then Mr. Free has seen stability gradually come into his farm enterprise.

The land is easier to work, soil losses have been halted, and more rain is entering the soil.

There has been a progressive increase in the yield of crops, and, what is most important, the property is no longer a liability, but an appreciating asset.

—*J. E. LADEWIG,*
Chief Soil Conservationist.

RELIABLE records are becoming essential for success in farming. They show a farmer what contribution his various programmes have made towards his overall profit and where waste or misdirection of effort has occurred.

Since every farmer's circumstances are different, no hard and fast rules can be laid down on what records should be kept. But there are two main sets—production or performance records and financial records.

Performance records will note briefly the history of your farm. They will show the treatment given to your paddocks and the yields you obtained. In much the same way, the livestock farmer can record the performance of his animals.

For financial records, you don't need a complicated system of bookkeeping. But you do need to know what you've spent on assets, and on the fuel, seed and fertilizer you've used to grow your crops.

— *C. H. P. DEFRIES,*
Director of Economic Services.

RUST is the silent enemy of all farm machinery. It causes breakdowns and increased fuel consumption, and will greatly reduce the working life of a machine.

The worst rust damage occurs in unprotected idle machines. Expensive machines like harvesters and pick-up balers that are used for only a short season lie idle, a target for rust, for up to 80 per cent. of their lifetime.

The first need in protecting farm machinery from rust is to store it in a dry place immediately after use. When storage space is limited, as it so often is, concentrate on putting under cover those machines that are prone to the greatest damage from rust. Don't use grease to protect the susceptible parts; instead use one of the rust-preventing preparations that are now on the market. These are cheap and they don't break down after a period like grease does.

WHEEL slip is very often the limiting factor in the performance of wheel tractors on drawbar work and is therefore one of the vital factors affecting tractor operation.

Wheel slippage, which is the degree of traction loss in a wheel over a measured distance, is not noticeable in practice, particularly with pneumatic tyres until it exceeds 30 per cent., and may even be as high as 50 per cent. before it becomes obvious.

An increase in wheel slip from 8 per cent. to 25 per cent. during ploughing, for example, may increase fuel consumption by as much as ½ gal. per acre. It is vital therefore to keep wheel slippage as low as possible, otherwise too much horse-power is lost before it reaches the drawbar for the pulling power required.

—G. G. WRAGGE,
Agricultural Engineer.

THERE are no short-cuts in getting lucerne established, least of all in land preparation. Failures or partial failures in lucerne plantings can all too often be traced to badly worked soil.

In coastal and subcoastal districts, the land should be ploughed in the late winter of the year before the lucerne is to be planted. In the spring, a cover crop of cowpeas, velvet beans or a mixture of either of these with one of the millets should be planted. These crops should be ploughed in before the millets seed, and the land kept harrowed until planting time in April or May.

In the dry, inland districts, fallowing is essential. This involves ploughing in the autumn or early winter of the year before it's intended to plant. To prevent weed growth and the formation of a hard crust during the fallow, the land should be cultivated until planting time.

—O. L. HASSELL,
Senior Adviser in Agriculture.

Ensiling Grain Sorghum

Some farmers have inquired about the ensiling of grain sorghum.

Answer: Grain sorghum can be made into a fair silage provided it is cut at the correct stage. Generally the stage selected is the soft dough to dough stage, or while the sorghum still contains sufficient moisture to allow satisfactory fermentation of the silage in the silo.

The material to be ensiled should be either flailed or chopped, preferably the latter, as whole stalks do not pack down well in the silo.

Whenever possible the use of a tractor to aid compaction in the silo is strongly recommended as such a practice ensures the greatest possible air expulsion from the silage.

Lucerne Halts Erosion On Dalby Plains

By R. F. S. KELSEY,
Soil Conservation Officer, Dalby.

Erosion and flooding are now major problems on large sections of the Darling Downs.

More than half a million acres are almost-level, fertile country. The fall is rarely more than 6 in. in 100 ft., and usually only 5 to 8 ft. in a mile. Wide stretches of uninterrupted cultivation have resulted in a large accumulation of run-off water.

Concentration of water has been aggravated as a result of the interception and diversion by fences, headlands, and road and railway formations. Concentration has meant greater depth of water and faster flows over certain sections. This in turn has resulted in wide-spread erosion and its associated evil—siltation.

The solution of the problem is not simple. Some reduction in damage could be effected by periodically placing a proportion of the plain under a perennial soil-protecting treatment such as pasture. This would be planted either in strips across the line of flow, or in lanes or waterways to carry the concentration of water. The deterrent to this is the difficulty in establishing high revenue-producing pasture on this type of country.

Plate 1.

Flooding on the Irvingdale Road, near Dalby, During the Rains in March, 1958.

Plate 2.

This Grim Picture of Erosion on the Plains Near Dalby was Caused by a Break in a Diversion Bank. It happened during the rains in March, 1958.

Because of the high returns associated with lucerne growing, this crop would be quite satisfactory. However, as there is normally an appreciable amount of bare soil between individual lucerne plants, it is usually considered to have only limited value for erosion control.

On steep hillsides, unprotected by contour banks, lucerne is not recommended as a complete safeguard against erosion. Neither is it recommended for planting in a waterway which will have to carry fast flows of water.

The speed at which water travels on the plain is comparatively slow and, except where contained in deep channels, would rarely exceed 3 ft. per sec. Observations in the Dalby District indicate that at this speed, lucerne is capable of holding the soil and preventing erosion.

During June, 1958, the Dalby District received a record rainfall of 781 points for the month. This caused extensive flooding and an unhappy "high" in erosion damage.

Value of Lucerne

These damaging rains demonstrated the value of lucerne as a soil-protector on gently sloping lands by preventing the development of "scouring". A typical example was observed on Mr. A. F. Berger's property in the Kaimkillenbun area. Mr. Berger's property adjoins the north branch of Myall Creek and sections are subject to flooding caused by the overflow from the creek. In two places a major concentration of water was caused by breaks in a levee bank.

Below the broken bank was a 9 ac. paddock of two-year-old lucerne. Severe scouring was evident on the cultivated land above the bank and on the cultivated land between the break in the bank and the edge of the lucerne.

A small amount of cutting back (limited to a few feet) occurred at the bottom end of the lucerne. This was caused by the drop from the secure lucerne paddock into the scours in the cultivation below.

Elsewhere the lucerne paddock was entirely undamaged. Even though depressions, resulting from previous land use, existed and had to carry a concentration of water, no soil movement took place. On the upper edges of these depressions, where the speed of water was reduced, a small amount of siltation occurred.

The scouring recommenced in the cultivation below the lucerne, and continued through the property.

It was calculated from the evidence available after the flood that the depth of flow in the existing depression was approximately 18 in. and the rest of the paddock was flooded to a lesser extent. The average slope of the paddock was 6 in. in 100 ft.

The lucerne was 6 in. high at the time of the flood. At that stage it would have retarded the flow of water only slightly. It was calculated that the velocity of the water would have been 3 ft. per sec.

Management of Lucerne

The 9 ac. of lucerne were sown in June, 1956, following a season of floods and worrying erosion. The rate of planting was 4½ lb. an acre. A cover crop of wheat was sown with the lucerne at 30 lb. an acre.

The following season was very dry. Rainfall records for the following two years are:

1956.	In.	1957.	In.	1957.	In.	1958.	In.
June ..	2·05	January ..	3·68	July ..	2·20	January ..	3·02
July ..	0·95	February ..	1·20	August ..	0·61	February ..	1·89
August ..	0·13	March ..	2·15	September	0·56	March ..	7·49
September ..	0·45	April ..	0·40	October ..	2·21	April ..	2·78
October ..	1·36	May ..	0·00	November	0·38	May ..	0·16
November ..	1·40	June ..	1·34	December..	0·37	June ..	7·81
December ..	6·70						

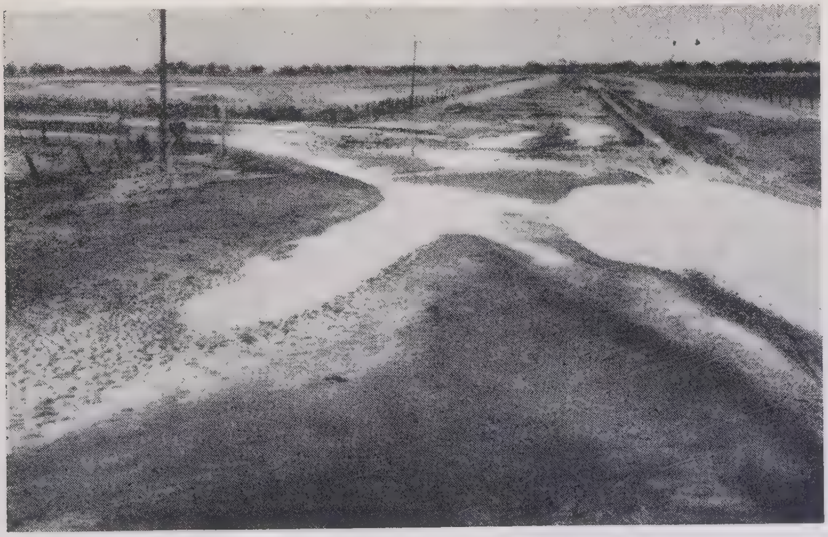

Plate 3.

Soil from the Farmlands is Deposited on the Irvingdale Road, After the Rains in June, 1958.

Plate 4.

Severe Scouring of Cultivation was Caused by the Overflow from Myall Creek.

Eight bags an acre of wheat were harvested in 1957 and although the 9 ac. paddock of lucerne had to struggle due to dry conditions, the following two cuttings of hay were made:

(*a*)	October, 1957	180 bales of hay.
(*b*)	April, 1958	400 bales of hay.

The baled hay, after being put through a hammer mill, was used on the farm as a supplementary sheep feed.

Mr. Berger is full of praise for the lucerne. He states that he has no doubts about the financial benefits of lucerne growing. He has this year extended his present 25 ac. of lucerne by a further 15 ac. and intends to further extend this acreage during the next few years.

Before September of last year, Mr. Berger carried 200 ewes and fattened and marketed 130 lambs on the 25 ac. of lucerne and 50 ac. of natural grass. The lambs averaged 75s. at 18 weeks.

The sale of lambs and wool returned over £1,000. At least £600 of this amount can be attributed to the 25 ac. of lucerne—a better return per acre than can be obtained from grain growing, which, under the same circumstances, would have resulted in serious loss of soil.

Since September, the same area, plus 30 ac. of canary, has carried the 200 ewes and an additional 80 from the carryover of lambs.

The lowering of soil nitrogen under the present cropping methods is a major problem. Mottling of wheat is one of many indications of trouble ahead.

Unlike most other crops lucerne, being a legume, does not draw to any great extent on soil nitrogen, but on the contrary after a few years in lucerne there is a build up in this all-important plant food.

King of Fodders

Similar experiences to Mr. Berger's have been reported by many Downs

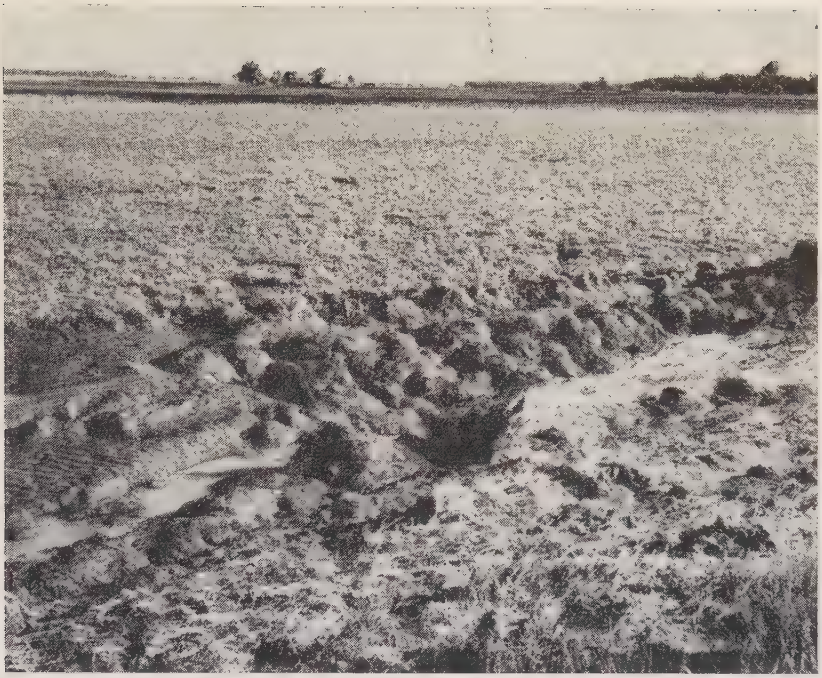

Plate 5.

Scouring of Cultivation Ceases when the Run-Off Encounters the Lucerne.

farmers who readily acclaim the merits of lucerne. The last drought proved its ability to carry stock under extremely dry conditions.

It is logical to expect that greater use will be made of this high revenue-producing crop in the future. Strips, planted across the line of water flow, would form an ideal basis for a crop rotation programme. A few years under lucerne will not only benefit the quality and quantity of future crops but, by giving the soil a spell from continuous cultivation, will improve its structure. Add to this its nitrogen-building ability and the fact that it is holding the soil against erosion and it will be clearly seen why this wonderful plant is known as the "King of Fodder Crops."

* * *

Don't Let This Happen

In a southern State, a farmer was clearing land with a bulldozer when a tree brought down high electric wires on to a fence. He apparently left the dozer, walked along the fence towards a car which was parked on the other side and when climbing over the fence was electrocuted with fatal results. This accident was the result of lack of appreciation of the dangers involved when working near high tension wires.

Orchard and Garden

IF you call an electrician because your fuses are blown, indicating a "short" or "leak" you expect him to find the fault as well as replace the fuse—not just to put a heavier fuse in. But how many of us bother to check the leaks in our fertilizer programme?

Consider these possibilities of loss one by one and ask yourself, are you doing anything to offset wastage?

Do you fertilize at the right time for the crop concerned? Have you checked your times of flowering and fruit maturity, and flushes of growth? Application too early or too late renders the fertilizer largely ineffective.

Do you use the right mixture, or just any old thing you have on hand? Remember very high applications of nitrogen have a serious effect on fruit maturity and keeping qualities generally, while insufficient phosphate or potassium can reduce yield.

Are your applications too light or too heavy? The former may be ineffective whilst the latter may not be used successfully.

Where do you put the fertilizer?—on the plant, burning it? On the ground outside the root area, so the plant doesn't get it at all? On one side as a lump, so that the high concentration kills the roots in the immediate vicinity? Or do you spread it sensibly within the drip area and in a nice even band so that all roots may have equal access to it?

What time of the year do you fertilize? Do you realize that judicious fertilizing before and after the wet season, and perhaps with irrigation during the dry season, helps to keep the nutrients up to the crop?

What reaction has your soil—acid or alkaline? Too much either way plays havoc with fertilizer usage by plants and very often results in "fixing" certain nutrients and they thus become unavailable. You should provide drainage for your soil, and lime to correct your high acidity.

There are many other points, such as frequency of application, disease, pest and moisture control, correct soil husbandry and so on which, when not watched, drag pounds of fertilizer out of your soil and pounds of money out of your pocket.

—*F. W. BUTCHER,*
Assistant Experimentalist.

LOPPING papaw trees after the crop has been harvested is a sound practice when the plants have grown tall and picking has become difficult. Rather than sacrifice healthy, tall trees, it's better to cut them back and force them to branch. The next crop will then be produced nearer the ground and within easy reach of the picker.

The recommended way is to cut through the stem about 3 ft. above ground level at a point where the old leaf scars are close together. Here, the stem is constricted and the internal cavity is small.

After lopping, cover the cut stem with a tin to keep out the rain. January is probably the best month to do the job. Allow no more than three shoots to develop. These should be selected for vigour and the acuteness of the angle formed with the main stem.

—*G. W. J. AGNEW,*
Senior Experimentalist.

The Farm Family

Your saw could be a killer ... if you let it

Compiled by A. E. FISHER,
Information Branch.

Neglect of maintenance could make a killer of that circular saw down in your woodyard.

True, accidents with circular saws aren't very common, but those that do occur are usually serious. Keep your saw and saw-bench in good mechanical order to rule out the risk of accidents from mechanical faults.

These days, nearly every farmer relies on the time- and labour-saving circular saw for cutting firewood. Very often, circular saws are driven by a tractor, so there's plenty of power in reserve. This sometimes gives a false impression of the sharpness and general condition of the saw, and routine maintenance is neglected.

Cracked or unsound blades are the biggest danger in using a circular saw. Inspect the blade every time you go to use the saw. Destroy any cracked or unsound blades so you won't be tempted to continue using them.

Practically all the other faults in the performance of circular saws can be traced to incorrect setting and sharpening.

Keep It Sharp

There's a very real risk in using a blunt saw. A blunt saw quickly becomes overheated and its temper is destroyed. As the heating often takes place unevenly, some sections of the blade can become distorted and cease to run true. Saws should always run true, both in respect to their sides and to the points of their teeth. Saws that are buckled, or wobble when run at the correct speed, can be corrected by hammering. But this should be done only by a skilled saw doctor.

After a great deal of use and sharpening, some teeth may be worn shorter than others. This fault can be corrected by jointing or stripping the saw. A saw is stripped by running it at half speed and holding a piece of emery wheel or a file at right angles to the saw and just touching the tips of the teeth. This grinds down the high teeth until all the tips form a true circle. After stripping, the points of the teeth need sharpening with a file.

In filing a saw, it is first necessary to hold it firmly in a filing vice or horse. As each tooth is sharpened, the saw is rotated and the next tooth is brought to the top of the horse. When sharpening, ensure that the bevels on the backs of the teeth are maintained.

When the saw wears down from regular sharpening, gulleting becomes necessary. Gulleting is done with a round file or a small power grinder.

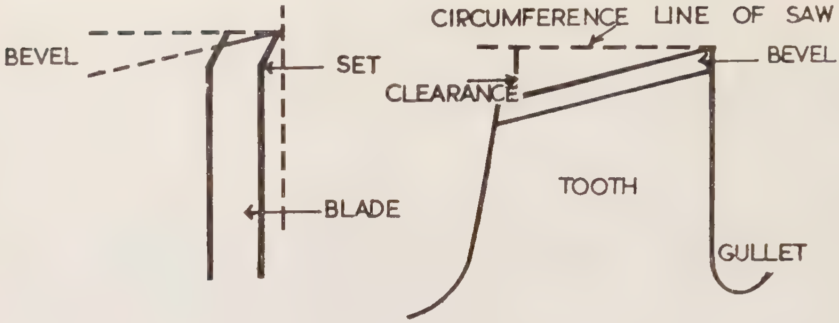

Plate 1.
Left: **Bevel and set of saw tooth.**
Right: **Saw tooth showing clearance.**

This job consists of cutting out the bottom of the gap between the teeth. Never use a file that will make a sharp angle at the bottom of the gullet, as a crack may develop when the load is put on the saw. A round gullet allows the sawdust to move freely, and the strain of the saw working is distributed evenly into the blade.

Saw Speeds

The correct speed of a saw, in revolutions a minute, varies according to its diameter. But they must always be run at this correct speed. If saws are run too fast, there is a risk that they may fly to pieces due to excessive centrifugal force. If they are run too slowly, the load on the individual teeth is greatly increased and the saw may jam or buckle.

The power needed to drive a circular saw depends largely on the rate of feed, depth of cut and whether the sawing is ripping or cross-cutting. The usual allowance for power is ½ h.p. for each 1 in. depth of cut when cross-cutting and 1 h.p. for each 1 in. depth of cut when ripping. The accepted rule for the speed at which the rim of a circular saw should travel is 9,000 ft. a minute.

When driving a circular saw from a tractor belt pulley, determine the correct speed and make a mark on the tractor's governor control. Usually the tractor has plenty of power to spare. Because of this, you can easily choose pulley sizes that will give the saw its correct speed at a fairly low throttle setting on the tractor. Obviously, it's a waste of fuel to have a 40 or 45 h.p. tractor running at full governed revolutions to drive a saw requiring only 5 h.p.

These are the correct speeds for saws of different diameters: 12 in. diameter saw, 3,200 r.p.m.; 14 in., 2,800; 18 in., 2,150; 24 in., 1,600; 30 in., 1,300; 32 in., 1,200; 36 in., 1,100.

It's not advisable to use a general purpose saw for both cross-cutting and ripping. The general purpose saw isn't as efficient on either job as the specially designed blade. It's better to have both cross-cutting and ripping blades on hand and to change them over for different types of work.

If you're using your saw a lot, it will need setting at fairly regular intervals. Setting involves turning the tip of each tooth a little to one side—alternate teeth are turned to the left and right.

This ensures that the saw cut or kerf is a little wider than the thickness of the saw. It prevents the timber binding on the saw.

A saw set of either the gate or pliers type is used for this job. At all times, set as little of the saw tooth as possible, just the tip. Usually, the amount each tooth is turned should not exceed one-thirty-second of an inch. As you set each tooth, check the degree of set with a gauge so that all the teeth will be set to the same extent.

Care with Firewood

Although a farm saw bench may be simple, it should be fitted with shields to protect the operator, both from the saw itself and from chips or pieces of wood that may be thrown by the saw.

When you're cutting firewood, don't place the saw among a pile of uncut wood and stand among the logs. This is a dangerous practice. It's easy to trip over a log, especially when you're carrying a heavy piece of wood. If this happens within reach of the spinning circular blade, the results can be fatal.

For reasonable safety, stack the logs neatly and choose a clear, level site for the saw and the operator. The operator should be comfortable so that there's little chance of anyting distracting his attention and causing accidents. Even with the best saw bench, sawing firewood is a risky job, and a great deal of conscious effort is necessary to ensure that you observe safe practices the whole time you're at the saw bench.

Chips and pieces of bark have a tendency to accumulate behind the saw. Occasionally, one vibrates into such a position that it is picked up by the revolving saw and thrown at the operator. Because of this danger, you should try to keep the top of the bench clear.

An added safety precaution is to fit a curved fin, about the same thickness as the saw blade, about a quarter of an inch away from the blade. This fin will prevent chips from striking the back of the saw and being flung at the operator.

Inquiry on Pigeon Pea

A farmer in the Bundaberg district has inquired about the uses of the pigeon pea.

Answer: The pigeon pea is a native of Africa, Asia and some of the South Sea Islands. It is a short-lived, perennial, erect bush which has been used as a fodder and as a soil improver. As it is deep-rooted and shows considerable adaptability, it has grown successfully on semi-arid lands. There are two types; an early type having yellow flowers and a late variety having yellow and red flowers.

Planting is best carried out just before the summer rains, that is, about early December. The rate of seed to the acre varies from about 10 lb., if drilled in rows of 3 to 4 feet apart, to 15 to 20 lb. to the acre if broadcast.

In some overseas areas it is reported to make good hay and silage and recorded yields vary from 18 to 35 tons per acre.

In Queensland its main uses are likely to be as wind breaks and soil improving crops in horticultural areas and as house plants in the coastal districts where frosts are not severe.

How to become a leader

By J. PARK, State Organiser,
Junior Farmers' Organisation.

IN the last two issues we have written at some length on the role of the chairman, and we pointed out that in a Junior Farmers' Club the club leader was also the chairman. As his name implies, however, the leader has to be more than a chairman—he has to display qualities of leadership not only during meetings, but at all times.

What is it?

It would be unwise to attempt to define here such an abstract word as "leadership". Even if it were said—as it reasonably might—that leadership is "the power to encourage others," it would still be necessary to say what form the encouragement should take in order to deserve the name of leadership. The word may be interpreted in different ways, and those who aspire to lead must decide whether they are going to use guidance or gunpowder.

To give a list of the personal qualities possessed by the perfect leader would be to describe the perfect man.

Even if we were to list a few of the most important qualities such as initiative and zeal, it could not be claimed that the leader alone is possessed of them. In this issue let us content ourselves with discussing a few of the principles of leadership that influence practice. On some future occasion we can consider the duties and responsibilities of a leader.

Take trouble to understand

People often say and do things for reasons very different from the ones they give and the ones that seem obvious. Patience and understanding are needed if we are to discover, tactfully, the real reasons. If we take the trouble to understand an action we are not necessarily indicating that we approve it. In thus gaining an appreciation of people's actions and characters we may be encouraged to look after and foster originality, and prevent the forcing of original minds into conventional grooves.

It is a sound principle to work on that everybody has some particular ability and knowledge that distinguish him from his fellows. If we give him the opportunity to use these we make him feel wanted, and he and those with whom he comes in contact profit as a result.

However, if responsibility is given, make sure that it is genuine and that it does, at least to some extent, involve making decisions.

Allow freedom of choice

People are, as a rule, more ready to follow a good example if they feel free to choose whether to do so or not. This sense of freedom is stimulated if, as suggested, we show trust in their fundamental good sense and a respect for their personalities.

The wish to be a leader of others should not spring from a desire to manage or possess them. People, especially young people, who find it difficult to be independent, must be encouraged in every way to develop in their own good time, self-confidence and the ability to "stand on their own feet". Young people must have opportunities to take the initiative, and when they do so it should be welcomed, even if the results are not always perfect. We may criticize their efforts, but let us not be superior about it.

Young people need to experience danger, but they must also be given a feeling of security. A balance between the two must be preserved.

Thus whilst we should permit young people to learn by doing, to learn by making their own mistakes, it is unfair to leave them, in their inexperience, to make all their own decisions without any guidance whatever. It may at times place on them an intolerable burden. Advice, guidance and rarely intervention may be needed to prevent a serious breakdown.

However, if advice is given and not taken, and the worst happens, we must resist the temptation to say "I told you so".

Few need special help

The majority of young people, when amongst their own kind, usually prefer to get on together rather than to fall out. The few, however, who have hidden problems that produce symptoms to stir up serious trouble, need individual help, and to discover their problems needs more than an interest in the annoying symptoms.

Sympathy is needed to distinguish between those who are unsure of themselves, those who are over-confident, and those who are at heart the one but in appearance the other.

Confidence in oneself breeds it in others, provided it is based upon a healthy, humble attitude of mind. Such an attitude is not self-effacement, but merely the realisation that we owe a lot to other people. What we are and what we can do are not due to ourselves alone.

Growing up

A leader may find that thought given to such matters as these helps him to handle the situations that arise when people combine, as in a club, to do things.

It is experience of these situations, and others like them, that help young people to grow up. Growing up is much more than becoming twenty-one and obtaining the right to vote. It is the process of becoming mature, and at various speeds it continues throughout life. Few can claim to be mature in all ways, and as individuals differ in the rate at which they mature, age is not an accurate measure of all-round maturity.

Characteristics of maturity

It is unlikely that there will be complete agreement as to the qualities that constitute maturity. Here are some to ponder over:

1. The possession of an open inquiring mind, and a recognition of one's own lack of knowledge.

2. A readiness to accept responsibility for one's own actions.

3. An acceptance of the fact that we all owe a great deal to the community to which we belong, and are willing to serve that community.

4. The ability to deal with people and situations.

5. To be articulate.

6. The power to concentrate and steadiness of purpose.

7. A satisfactory attitude to the opposite sex.

8. To have outgrown the self-interest which is typical of the very young.

In our next issue we will relate these characteristics to the needs and interests of young people, and determine what part the leader should play in catering for them.

Hints for Club Members

ALL junior farmers are entitled to a copy of the official Junior Farmers' Handbook. This book contains a reasonably complete guide for the successful operation of a club. It is suggested that members might refer to it constantly, and try out the suggestions it contains. Of particular interest is the section on planning programmes.

To encourage members to think, and to express their thoughts clearly and concisely, a public speaking contest is being conducted in the junior farmers' clubs. Those taking part would do well to remember that the average audience demands three things of a speaker: sincerity, simplicity and truth. If on all occasions that speeches are made, the public are given these, then the standard of public speaking will be raised considerably, and the benefits to the nation will be incalculable.

* * *

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*You'll Grow Better Wheat Following Lucerne**

Lucerne has once again shown that it can help wheat growers increase the yield and protein content of their crops.

WHEAT grown on land previously under lucerne found a place among the winners in the 1958 Field Wheat Competition. For the last three years, championship field or bushel-of-wheat entries have come from crops that followed lucerne in rotation.

[The field wheat competition is organised each year by the Royal Agricultural Society of Toowoomba.]

The reserve championship in the 1958 competition went to Mr. H. H. Tod, of Jondaryan, with a crop of Lawrence. Though grown on downs country that has been cropped for 60 years, it yielded 45 bushels an acre with a grain protein content of 14.3 per cent. In addition, the crop was heavily grazed.

The main reason for this outstanding performance was that the wheat followed lucerne in a five-year rotation. The lucerne had enriched the soil and improved its physical structure so that it was in ideal condition for wheat growing.

Further evidence of lucerne's worth in wheat growing was brought to notice right on Mr. Tod's own farm. His wife also had an entry of Lawrence in the competition. This entry was in a paddock adjoining the old lucerne land and on cultivation only 12 years old. But it followed a linseed-short-fallow rotation. It was so inferior to the Lawrence that followed lucerne on the 60-year-old cultivation that Mrs. Tod withdrew her entry.

The championship went to a crop produced on the brigalow country and grown by Messrs. T. M. P. Ziesemer and Sons of Condamine. This crop of Spica, grown on virgin soil, yielded 47 bushels an acre with a protein content of 16 per cent.

Boost for Brigalow

In the past, the black earths of the Darling Downs have always claimed the championship. Now that the mantle has fallen on the brigalow country, it could well cause an upsurge of interest in this vast tract.

Grain protein content of all the entries from the brigalow soils was high. Average protein content of all competition entries was 13·3 per cent. But the average of the entries from the brigalow was 15·3 per cent., and that of the remainder 12·4 per cent.

Study of the protein content of all entries suggests that, on the Darling Downs, this depends largely on land

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*[Compiled from the judges' report on the Royal Agricultural Society's 1958 Field Wheat Competition. Judges were Messrs. J. Hart, Senior Adviser in Agriculture, Department of Agriculture and Stock, Toowoomba; and C. S. Clydesdale, Field Officer, Queensland Wheat Board.]

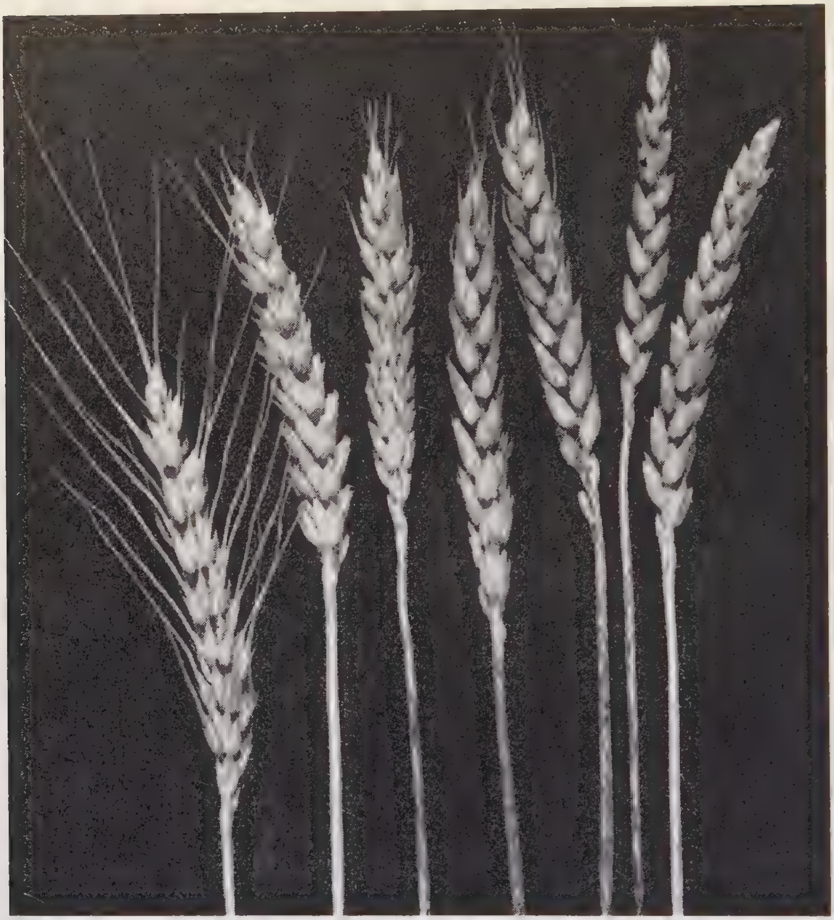

Plate 1.

Which Varieties Would You Select? They are (left to right): Spica, Festival, Gabo, Charter, Koda, Puora, and a Puora back-cross which will be named during the present season. Note the difference in the stem rust between resistant and susceptible varieties.

management. Both the highest and lowest protein figures were found in the same district—the highest, 15·6 per cent. at Jondaryan, and the lowest, 9·5 per cent. at Dalby.

In the brigalow belt, the districts longest under cultivation returned the lowest protein figures.

Brigalow-belt growers would do well to heed this pointer. Obviously, new ground will produce grain equal to the best in Australia. But fertility can drop quickly.

For maintenance of fertility, and fertility of course directly influences yield and protein content, growers

Plate 2.

Mr. T. M. P. Ziesemer in a Prize-Winning Crop of Gabo. Gabo is not a "showy" variety, but note the mass of grain heads.

should study Mr. Tod's rotation. On the brigalow lands, lucerne may be just as useful in restoring and maintaining yields as it is on the downs.

Proper management appears to be the key to the successful development of the brigalow lands as a major grain-growing area. Under a programme designed to maintain fertility and protect the soil from erosion, a bright future would seem assured.

Varieties of Rust

Rust was a serious problem in the 1958 competition. It caused the withdrawal of 58 or 16 per cent. of the entries and reduced the yield and general scoring ability of many others.

Gabo, Charter, Puora, Seafoam and Koda were the varieties most seriously hit. Some areas were completely destroyed, but others, because of peculiar local conditions, escaped with only slight loss.

The judges' experience in this competition suggests that only three of the available varieties now remain resistant to stem rust. They are Spica, Festival and Lawrence. In any district subject to stem rust—and this includes most districts in the State—Departmental recommendations cannot go beyond these three. Lawrence is the outstanding recommendation for early sowing and Spica and Festival are best for midseason or late sowing.

There should be seed of at least two new Queensland crossbreds to add to these three in the 1960 season.

Some growers may find it hard to discard Gabo, that quick, high-yielding, short-straw wheat. But there's no room for loyalty to past performers. What happened to Gabo in 1958 can and will happen again!

The Awards

The competition attracted 364 entries, but 90 were withdrawn before final judging.

Plate 3.

Mrs. V. R. Welsh, of Jackson, Framed in a Background of the Fast-Developing Brigalow Country.

Plate 4.

Lucerne Grows Well on the Downs Country. This fine crop was produced by Mr. S. Johns on the heavy black soils of the Bowenville district.

Results were:

Grand Championship—T. M. P. Ziesemer and Sons, Condamine; Spica.

Reserve Championship—H. Tod, Jondaryan; Lawrence.

Zone 1—H. Tod, Jondaryan, Lawrence, 1; B. D. Teakle and Sons, Jondaryan, Festival, 2; J. Gwynne, Jondaryan, Festival, 3.

Zone 2—J. E. Bligh, Brookstead, Festival, 1; L. E. H. and L. Garthe, Yandilla, Spica, 2; D. G. G. and H. Bligh, Brookstead, Festival, 3.

Zone 3—L. and G. L. Sandercock, Jimbour, Spica, 1; I. G. Paterson, St. Ruth, Festival, 2; W. J. Morris, Pirrinuan, Spica 3.

Zone 4—T. M. P. Ziesemer and Sons, Condamine, 1 (Spica), 2 (Koda), and 3 (Gabo).

Zone 5—Black and Staines, Guluguba, Puora, 1; Staines, Coutts and Bahnisch, Guluguba, Gabo, 2; A. E. and C. L. Westman, Clermont, Festival, 3.

* * *

Wheat for Storage

A General View from the Top of Overhead Silos Showing Last Season's Wheat Arriving for Storage at Malu.

Plate 1: Maintaining a More Even Sward by Regular Topping with the Mower.

Good Pasture Management Pays

By A. HUTCHINGS,
Senior Adviser in Cattle Husbandry,
and O. L. HASSELL,
Senior Adviser in Agriculture.

By good pasture management and careful attention to stock, Mr. J. Hausman maintains daily production of 50 gallons of milk from his herd of 32 cattle. Only small amounts of supplementary feed are bought and this is a one-man 40-acre farm.

Three years ago Mr. J. Hausman sold his rugged scrub property at Mt. Mee and purchased this property at Bald Hills. The farm had been very much overstocked but by sound management it is now providing a good living.

Pastures and Management

The land is slightly undulating. The soil consists of a gravelly clay loam overlying tightly packed clay at a depth of about 6 in. Fences have been built and there are now eight paddocks, the largest being 10 acres. Paspalum, kikuyu and wild white clover are the major pasture plants on this property and Mr. Hausman says this is the "home of clover".

It is worth noting that progressive farmers, in areas where white clover will grow, make every effort to improve its yield; they know how important white clover is in pastures.

Surplus grass growth is mown to a height of approximately 4 in. with an old-type mower drawn by a light tractor. The grass is mown before it seeds, so as to maintain young grass growth and allow clover to come through. During wet seasons, the grass is mown several times. Cattle eat some of the freshly mown grass as it is "haying", and the remainder provides mulch to protect surface roots from the hot sun and storm rains and to contribute to soil fertility.

Renovating and Manure Spreading

Droppings are spread with a set of diamond tooth harrows. A number of paddocks are renovated with a chisel plough each year to loosen the hardened surface soil, thereby improving water penetration, aeration and fertility. The harrows follow the chisel plough to remove clods and fill in the hollows.

Although artificial fertilizer has not been used, four paddocks will be top-dressed with superphosphate next year.

This is becoming important on many coastal dairy farms. A considerable amount of fertility is removed from farms selling whole-milk. Superphosphate stimulates

Plate 2.

Natural Shade Adjacent to Small Paddocks.

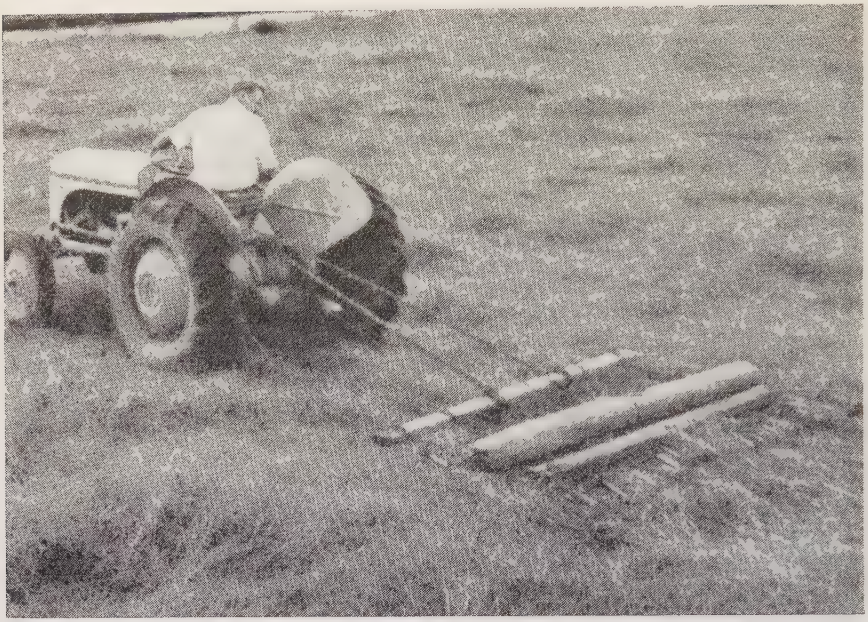

Plate 3.

Spreading Droppings to Maintain Steady Grass Growth.

clover growth, which in turn supplies nitrogen to the grass. On a number of pastures on other properties an application of sulphate of ammonia has also prolonged grass growth in autumn and accelerated spring growth.

In three years heavy weed growth has been replaced by relatively good grass and clover by this form of management. Some persistent thistle growths are chipped by hand.

Irrigation

A spring provides a good supply of water in a small dam, and to date, four paddocks have been irrigated. Spray irrigation is used. During the drought of 1958, a 4-acre paddock was given a ¾-hour application of water twice weekly. By controlled grazing on this paddock, supplemented with 2 lb. of pollard for each cow each day, and a few pounds of lucerne chaff, 25 cows produced 45 gallons of milk daily.

The Dairy Herd

A mixed herd of 32 cows, mainly Jerseys, is kept. There are eight registered animals.

The bull is kept in a separate paddock. He is hand-fed during the mating season and a month before. All cows are hand-mated and accurate breeding records are kept. Breeding troubles have been negligible.

Matings are arranged for April-May calvings. This, together with a regular supply of nutritious feed and a mild form of steaming up, so that the cows are in very good condition at calving time, provides for a good winter production.

Production is generally steady at the 50 gal. level from 25-27 cows in milk. As the herd is always well fed and most of the cows are in advanced lactation by Christmas, there is not a great increase in production during

Plate 4.

Chisel Ploughing Improves Water Holding Capacity of Soil and Pasture Growth.

the summer "flush" period. Annual production is over 450 gal. of milk to the acre.

Conservation

A small paddock has provided sorghum or maize for green feed but this is to be replaced by cow cane. In addition, a strip of cow cane has been planted along a western fence and serves a double purpose as a windbreak and as feed, if needed, when pasture growth is at its lowest in spring.

Water and shade are accessible from most paddocks. The compactness of the property and appropriate paddock layout do away with long walks by stock at any time. Careful farm planning and attention to the details of pasture management are paying dividends on this property.

* * *

Safety First

When using power take-off or running engines in enclosed sheds, ensure that there is ample ventilation so as to avoid poisoning from exhaust fumes. Keep all doors and windows open.—Industrial Safety Advisory Service.

Big Fodder Yields From Small Water Supplies

By A. NAGLE,
Irrigationist.

Small supplies of irrigation water can play a surprisingly big part in growing fodder in Queensland. Used to supplement moisture stored in fallows and from irregular storms, light but timely irrigations will carry a crop through to maturity without loss in yield.

YEAR-ROUND irrigation of perennial crops like lucerne and pasture is no doubt the ideal way to use irrigation water and equipment profitably. But in many parts of Queensland, irrigation water supplies drop so low every dry spring that watering restrictions have to be imposed.

It is here that supplementary irrigation can give such an amazing response.

Let us consider the yields and water requirements of some of our best fodder crops.

Lucerne, for example, is the crop most widely grown in Queensland for conservation as hay. Under irrigation, hay yields up to eight or 10 tons an acre are not uncommon, while yields of green material are in the region of 40 tons an acre.

However, lucerne is a heavy user of water. Between 800 and 1,000 tons of water are required to produce one ton of dry matter. (This, of course, is the amount of water available to the plant, not rainfall or irrigation water. One acre-inch of water weighs 100 tons.)

The actual amount of water required to produce a ton of lucerne will vary with seasonal conditions. During hot, dry weather, the plants naturally need more water than they do under humid conditions. Under the conditions at Biloela and Gatton, 24 in. of irrigation water in addition to the 26 to 28 in. rainfall can be expected to give an annual yield of 7½ tons of hay to the acre. An application of 40 in. of irrigation water a year has given a yield of 10 tons of hay. These high yields make lucerne an attractive crop.

Irrigated pastures, too, can play an important part in fodder conservation. Yields in the region of 40 tons of green material or a grazing rate of 1½ to 2 dairy cows to the acre have recently been recorded. Small areas of irrigated pasture can serve as a valuable fodder reserve. Although pasture uses about the same quantity of water in a year as lucerne, it is shallower-rooted and needs more frequent irrigations than the deep-rooted lucerne.

It is clear, then, that both lucerne and pasture need large quantities of water. This will not present any difficulties in favoured areas, but in many

Plate 1.

Light But Timely Irrigations Can Carry a Crop Through to Maturity Without Loss in Yield.

places the requirements of these crops just could not be met.

Use of Annual Crops.

This brings into the picture the merits of annual rather than perennial crops in making the best use of limited water. Here the place of irrigation lies in supplementing rainfall and moisture trapped in fallows. In recent years, this has been studied at the Gatton Regional Experiment Station. The studies have shown that a 2-in. irrigation or thereabouts, applied when the crops are about to suffer from water shortage, is usually sufficient to ensure a good yield.

Trials have shown that some of these short-term plantings will produce from one to two tons of green forage a week.

For example, a planting of Lawrence wheat and dun field pea averaged 1½ tons of green material a week. This crop was planted in a moist seedbed in midwinter, and there was no further rain. A 2-in. irrigation was given five weeks after planting, and after 10 weeks' growth the crop yielded 15½ tons of green material an acre.

Another mixture, Lawrence wheat and field peas, yielded 14¼ tons an acre for an average production of just over 1 ton of green material a week. There was a good soil moisture at planting time, and because no rain fell, a 2-in. irrigation was given about six weeks later. Just before harvest there was a 3-in fall of rain, but this was largely too late to influence the yield.

Oats and barley have also given greatly increased yields after one timely irrigation. Up to five tons of oaten hay an acre have been taken off.

Summer Crops.

Summer crops have responded well to supplementary irrigation, even though the rates of evaporation and transpiration are much higher than in the winter.

A planting of white panicum and Poona cowpea produced 13½ tons of green material an acre in six weeks' growth. This is an average green-weight production of 2¼ tons a week. The crop was produced on stored soil moisture with a two-inch irrigation about a fortnight after sowing.

Another planting of white panicum and Poona cowpea made during a dry December yielded 22 tons green weight an acre after 10 weeks' growth. Although the season was dry, the only irrigation this crop was given was an application of 1¾ in. about six weeks after sowing.

Yields of Sugardrip sweet sorghum at Gatton have reached 35 tons of green material an acre. The crop was given irrigations of 1 in. at planting and a further 2 in. during the growing period. Without irrigation, eight to 10 tons an acre can be expected, so in this instance, irrigation trebled the yield.

Maize can also give high yields under irrigation. Crops of maize and sorghum irrigated for silage can ensure that the silos are filled in the expectancy of lean periods in winter and spring.

It is important to realise that stored soil moisture has played a big part in obtaining these high fodder yields. Although the crops have received at the most 2 in. of irrigation and 1 in. of rain during the effective growing period, stored soil moisture has amounted to another two or three inches.

It can be seen that five to six inches of water can be relied upon to produce from 15 to 20 tons of green fodder in six to 10 weeks. The use of fallows and irrigation water in this way is worth serious consideration when water is limited or where the soil is unsuitable for lucerne.

It is quite clear that irrigation need not be limited to perennial crops. With supplementary irrigation, plantings can be timed to meet seasonal shortages of fodder, which every farmer can predict fairly accurately. It will also extend the growing season to permit double cropping; that is, winter cereal crops can be followed by summer fodder crops. By ironing out the seasonal shortages of fodder through irrigation, planned dairy production is possible.

In the end, of course, only the farmer himself can decide how to make the best use of his available irrigation water. The courses open to him are: to grow lucerne or pastures with their high year-round water requirements; to grow short-term grazing crops with supplementary irrigation; or to use supplementary irrigation to grow maize or sorghum for silage.

Therefore, his decision must be based on a review of his available water supply, the water requirements of his crops and the seasonal fodder needs of his farm.

* * *

New Members Wanted

You can help to keep down herd recording costs by assisting to keep groups at full strength.

Your local dairy officer would be pleased to hear of any prospective new members.

Talk it over with your neighbour.

Pasture and Crop

Green Panic Pastures—Once a green panic pasture has germinated, its success and persistence are influenced directly by its management. Failures after a good strike have often been traced to heavy and continuous grazing.

Withholding grazing is recommended in the first year until after the pasture has seeded. This is a safety measure to ensure that seedlings will come up in the next summer to replace any plants that have died. If early grazing is necessary, allow about 12 in. to 2 ft. of bulk to develop before grazing lightly.

Green panic should go into the winter with some bulk growth as crown protection. Avoid close grazing or mowing between late autumn and early spring. Rapid, but not close. grazing followed by four to eight weeks' spelling, has given the best results, especially when lucerne is sown with the grass.

—*S. MARRIOTT,*
Assistant Director of Agriculture.

Profit in Reclaiming Eroded Land—Increases in yield usually repay a farmer handsomely for the money spent stabilizing eroded land. There's not enough recognition of the yield increases that follow land reclamation. Instances of the benefits that can accrue are seen in the experiences of two Queensland farmers.

One farmer at Cambooya found that, eight years after implementing a soil conservation programme, his barley yields had increased from six bags an acre to 15 bags. In addition, his land is now cheaper and easier to work. More than 100 miles away, a farmer at Wooroolin got an immediate profit. He contoured his whole farm at a cost of £500. This included a 30-acre paddock that had been abandoned from cultivation for many years because of erosion. From the first crop after reclamation, this paddock returned a profit of £1,000—double the cost of treating the whole farm.

—*J. E. LADEWIG,*
Chief Soil Conservationist.

Paspalum - White Clover—Treated as a perennial crop, paspalum-white clover pastures are highly productive and repay handsomely the cost of the extra attention they need. Low yields are usually the direct result of poor management.

Summer management of these pastures calls for mowing the vigorous paspalum. However, regrowth is often so rapid that the paspalum is again rank and unpalatable before the next grazing. This can be overcome by high mowing or topping, six to 10 days before grazing.

Sod-seeding white clover and rye grass into the sward in the autumn will boost winter forage yields. Deferred grazing will also increase the winter feed supply. This involves mowing in April and allowing the regrowth to stand over until July or August. In this way, autumn-saved pasture is on hand to meet the seasonal shortage of nutritious fodder.

—*A. NAGLE,*
Irrigationist.

Certified Seed for 1959—This year a number of farmers throughout the State have once again undertaken the production of certified seed of various crops. Yield prospects of these crops are extremely bright, and although harvesting of some has not commenced yet it appears that with the exception of bean seed, the supply of certified seed will meet the demand for the next planting season.

Crops being grown for certified seed production include a number of late and mid-season maturing maize hybrids, several varieties of grain and sweet sorghum, sweet sudan grass, three tomato varieties, Biloela and Gayndah buffel grass and three french bean varieties.

All certified crops are grown, harvested and the seed cleaned under strict Departmental supervision to ensure that the high quality of the seed is maintained. The seed is sold only in sealed bags labelled with a certification label or in sealed certification packets.

—*N. V. HIBBERD,*
Standards Branch.

* * *

Barley a Popular Crop

A BARLEY CROP GROWN AT WACOL LAST SEASON. In 1958, the main barley growing area in Queensland, the Darling Downs, produced a record 7,250,000 bushels from 220,279 acres.

Economic Feeding Of Our Dairy Herds—II.

By W. F. MAWSON, Senior Adviser
in Cattle Husbandry.

Information on the nutritive values of foodstuffs and the nutritional requirements of dairy cows will help the farmer to work out an efficient and economic feeding programme.

In order to understand differences in the values of various foodstuffs it is desirable to define some terms which are commonly used. You need a working knowledge of the following:

1. *Dry Matter (D.M.)*. This refers to the water-free content of a foodstuff. Chemical analyses of foodstuffs in Queensland are given a "Dry Matter" basis as this allows comparison on a food value basis. The cow's appetite is estimated in terms of Dry Matter rather than in pounds of food as eaten. Examples of the Dry Matter content of feeds are given towards the end of this article.

2. *Total Digestible Nutrients (T.D.N.)* This is an expression of the total nutrients in 100 lb. of the material. The T.D.N. value is usually given in terms of Dry Matter. It is the measure of the energy value of a food and does not take into account the loss incurred in digestion. The term "food units" is also used instead of S.E.

3. *Starch Equivalent (S.E.)*. This is a measure of the energy value of a food so that T.D.N and S.E. are similar in principle. The difference is that T.D.N. is a *gross* measure and S.E. an estimate of a *net* measure. S.E. gives the value of 100 lb. of foodstuff in terms of starch.

4. *Digestible Protein (D.P.)*. This gives the number of pounds of digestible protein per 100 lb. of feed—again usually on a Dry Matter basis. Chemical analyses show protein as "Crude Protein". The relationship between Crude Protein and "Digestible Protein" varies according to the type of feed. Most of the protein-rich meals are highly digestible and the digestible protein content can be expected to be from 80 to 90 per cent. of the crude protein.

With reference to grasses and crops, a guide is as follows (D.M. basis):

Crude Protein Content.	Digestibility Estimate.	Digestible Protein.
15% and over	70%–75%	11% and over
10%–15%	60%–70%	7%–11%
Less than 4%	Nil	Nil

Protein is essential in many body functions including muscle development, repair of cells and milk production.

production. Especially during winter, many pastures are low in phosphate and this brings about a deficiency in the animals.

Animal Requirements.

TABLE 1

GUIDE TO DAIRY COW FEED REQUIREMENTS PER DAY UNDER GRAZING CONDITIONS.

a Maintenance :

Type of Cow.	Average Bodyweight (lb.).	Dry-matter (lb.).	T.D.N.	D.P. (lb.)
Jersey	800	18–22	7·0– 8·0	0·5 –0·6
Guernsey and Ayrshire	900–1,000	22–26	8·0– 9·0	0·6 –0·65
A.I.S.	1,000–1,200	25–30	9·0–11·0	0·65–0·75
Friesian	1,100–1,400	27–35	10·0–12·5	0·7 –0·85

(*b*) *For Milk Production* :

Add for each gallon of—

	T.D.N.	D.P. (lb.).
4 per cent. Milk	3·0	0·50
5 per cent. Milk	3·5	0·55

(*c*) *For Reproduction* :

Add to maintenance for last 2–3 months—

T.D.N.	D.P.
6·0	0·60

Example: What are the requirements of an A.I.S. cow giving 3 gallons of milk a day?

	T.D.N.	D.P.
(*a*) Maintenance	10·0	0·7
(*b*) 3 gallons of 4%—		
(T.D.N.) (3·0 x 3)	9·0	..
(D.P.) (0·5 x 3)	..	1·5
	19·0	2·20

Mineral Requirements

While the dairy cow requires many minerals for proper nutrition, these are normally obtained by the grazing animal. In Queensland, phosphorus is the outstanding exception. This mineral is usually referred to in terms of phosphate. A deficiency of phosphate is often shown by a depraved appetite when the animals chew bones, rags or bark; a rough coat, fragile bones and low milk

Milk is rich in phosphate—there being about ⅓ oz. in each gallon. The quantity of phosphate in milk remains relatively constant so when a deficiency of phosphate occurs, the milk supply is reduced rather than the phosphate content of the milk lowered.

To ensure that a lack of phosphate does not limit production, it is essential that a reserve be built up in the bones of the cow while she is dry. Dry cows have the ability to store both phosphate and lime (calcium) in the bones. Heavy producers are unable to absorb sufficient phosphate from the feed to compensate for the amount secreted in milk during the early part of lactation.

Attention must be paid to the needs of the dry cow. Phosphate can be supplied by means of bone meal or bone flour either mixed in feed or placed out as a lick with coarse salt. The quantities required will vary but as a guide, dry cows and milkers should receive 2–4 oz. daily in feed. Two ounces of bone meal supplies almost enough phosphate for 1 gallon of milk. When a lick is provided, free access should be allowed. The lick composition can be as high as 75 parts bone meal and 25 parts salt by weight but if stock will not eat this mixture a 50–50 mix can be used.

Methods of adding phosphate to drinking water can be used but are effective only where animals have access to no other source of water supply.

All feeds supplied to cows contain some water or moisture. The food nutrients are contained in the "water-free" fraction (Dry Matter) and thus the proportion of dry matter in a foodstuff should be known. The following table is a guide to the amounts of water and dry matter in representative foodstuffs:

TABLE 2

AVERAGE DRY MATTER CONTENT OF TYPICAL FEEDS.

——	Percentage Dry Matter.	Percentage Moisture or Water.
Lush pasture or irrigated pasture ..	10–15	85–90
Growing pasture or crop	20–30	70–80
Silage	25–30	70–75
Pasture or crop at seeding stage ..	35–40	60–65
Hay	85–90	10–15
Grains	87–92	8–13

Plate 4.

A Dehorned Herd Quietly Strip-Grazing a Winter Crop.

Example of Appetite Requirements of 1,000 lb. cow (25 lb. Dry Matter) based on above figures—

Lush pasture or irrigated pasture—200 lb. green wt.

Growing pasture or crop—100 lb. green wt.

Silage—90–100 lb. green wt.

Pasture or crop at seeding stage—70 lb.

Hay—30 lb.

Grains—not suitable alone.

From this example several points should be noted—

1. Owing to the very high moisture content of lush pasture, cows may not be able to satisfy their dry matter requirement. In addition, the T.D.N. intake may be low, resulting in loss of body condition.

2. Lack of palatability of pasture at the seeding stage may lead to animals not eating their full requirement. The protein intake is likely to be low, resulting in reduction in milk production.

3. Any rain or dew on these pastures will further increase the water content of the material ingested.

4. High producers often have an appetite limit higher than average.

The figures are only guides, as variation will occur due to such factors as soil fertility, stage of harvesting, species of grass and conditions during conservation.

It is generally agreed that production suffers when the crude protein content of the feed falls below 13 per cent. A glance at the table will show that good quality pasture or grazing crop can be expected to contain over 13 per cent. protein. Legume silage or lucerne hay of above average quality are borderline.

The following example shows how to use the tables in estimating the productive worth of feeds—

A 1,000 lb. cow eats 25 lb. dry matter of growing pasture. Her food intake is—

		T.D.N.	D.P.
T.D.N.	$\frac{25}{100}$ of $\frac{60}{1}$ = 15·00	15	..
D.P.	$\frac{25}{100}$ $\frac{15}{1}$ = 3·75	..	3·75

Maintenance requirement of a 1,000 lb. cow is 9.0 T.D.N. and 0.65 D.P. The amount left for production is 6.0 T.D.N. and 3.15 D.P.

Guide to Value of Fodders

TABLE 3

Figures are Shown per 100 lb. Dry Matter.

——	T.D.N.	D.P.
Lush pasture or irrigated pasture (those containing a high proportion of legume would have an even higher protein content)	60–65	20
Growing pasture or grazing crop	55–60	10–15
Grass or crop in seed (depending on species)	45–55	1–8
Standing mature grass (depending on species)	25–40	0–2
Maize, sorghum, silage or green fodder	60–70	4–8
Lucerne or cowpea silage	50–55	10–12
Cow cane	50–55	2–4
Molasses	50–60	0
Lucerne hay	50	10–12

There is sufficient T.D.N. for 2 gallons of milk and enough digestible protein for 5 to 6 gallons. In such a case it is likely that the fresh cow will produce 3½ to 4 gallons of milk. This is possible by two means. Some of the surplus protein can be used for energy purposes and the animal can also use any body reserves of fat for the same purpose. It is important to note that while part of surplus protein can be used as energy, surplus energy cannot be used as protein.

TABLE 4

Grains and Other Concentrates.

——	T.D.N.	D.P.
Wheat ..	80	8–10
Sorghum ..		
Maize ..		
Barley	75	7
Oats	70	8
Wheat Bran ..	60	11–14
Wheat Pollard ..	70	11–14
Blood meal	70	70
Meat and Bone meal (Protein meal) ..	65–70	35–50
Peanut meal ..	75–80	35–40
Cottonseed meal ..	65–75	33–38
Linseed meal ..	70–75	25–28
Coconut meal ..	70	15

Grains generally have a high T.D.N. value and are somewhat low in protein. Various meals are high in protein and also have a fairly high T.D.N. value. Table 4 sets out a guide to the value of common foodstuffs in these groups.

By law, meals prepared by various firms are required to carry a label on every bag. On the label is indicated, among other things, the percentage of crude protein. The crude protein in such meals is normally highly digestible and the digestible protein can be estimated at 80–85 per cent. of the crude protein figure.

When buying concentrates, the first essential is to know whether an energy-rich feed (high in T.D.N.) or a protein-rich feed (high in digestible

Plate 5.

Good Husbandry is Reflected in a Well-Managed and Profitable Herd.

protein) is required. Then the cost per unit T.D.N. or D.P. should be calculated and the purchase made on the basis of the cheapest unit.

Concentrate Mixtures

There is little advantage in feeding a mixture of many feeds as a concentrate. Provided changes in feed are made gradually, the cow's digestive system will adapt itself. Any concentrates fed will be basically either grains or meals or a mixture of the two. If prices are about the same it is wise to use a mixture of two grains and/or two meals. Should one become in short supply or rise steeply in price, a switch can be made to the other one without inconvenience.

Meat and bone meal and also blood meal are less palatable than most other meals, and animals usually require a gradual introduction to them. For example, a farmer who was using peanut meal as a protein concentrate would probably find difficulty—and loss of production—if he were forced to change over to meat and bone meal within a couple of days. The wise plan in this case is to start using a little meat and bone meal a month or so before the supply of peanut meal is exhausted.

The following table gives the cost per unit of T.D.N. and D.P. for the commonly purchased foodstuffs. Those with the lowest cost per unit are the cheapest. Thus molasses bought for £2 a 44-gallon drum costs 1.3d. a unit of T.D.N. and lucerne hay at £10 costs 2·2d. a unit of T.D.N., and are the cheapest shown in the table. Lucerne at £10 a ton costs 10.8d. a pound digestible protein and is a cheaper source of protein than, for example, peanut meal at £40 a ton. However, when lucerne exceeds about £13 a ton, the position is reversed. When quantities of feed are bought it pays to watch prices very carefully. The table shows some prices of feeds and their value per feeding unit at that price.

TABLE 5

COST OF VARIOUS FEEDS BASED ON FEEDING VALUE.

Feed.	Cost per Ton.	Cost per 100 lb.		Per 100 lb. of Foodstuff.		Cost per Unit.	
				T.D.N.	D.P.	T.D.N. (Pence).	D.P. (Pence).
	£	s.	d.				
Lucerne Hay	20	18	0	50	10	4·3	21·5
	10	9	0			2·2	10·8
Wet Brewer's Grains ..	3	3	0	15	3·5	2·4	10·0
Wheat	20	18	0	..	..	2·7	24
Maize	25	22	6	80	9·0	3·7	30
Sorghum	30	27	0	..	..	4·0	36
Bran	20	18	0	60	12	3·6	18·0
	25	22	6			4·5	22·5
Pollard	20	18	0	70	12	3·1	18·0
	25	22	6			3·9	22·5
Blood meal	45	40	0	70	70	6·9	6·9
Meat and Bone meal ..	40	36	0	70	45	6·2	9·6
Peanut meal	40	36	0	80	35	5·4	12·4
Cottonseed meal	40	36	0	75	33	5·8	13·0
Linseed meal	40	36	0	70	25	6·2	17·3
Coconut meal	33	30	0	70	15	5·1	24·0
Molasses—							
Per 44 gallons	2	6	8	60	Nil	1·3	..
Per 44 gallons	5	16	8	..	..	3·3	..

This table is by way of example since prices vary. It does show how to apply a knowledge of feeding values, and the necessity of knowing what is required before attempting to buy. To make the calculations, obtain the price per 100 lb. and divide by the T.D.N. or D.P. value. This will give a price in terms of units of T.D.N. or D.P., which is the best basis for comparing feeds.

More detailed advice on many aspects which have been mentioned is available from various branches of the Department of Agriculture and Stock. Pamphlets which deal with such subjects as crop growing, pastures, silage and hay making, prevention and treatment of such conditions as bloat and grass tetany and other aspects of dairy production may be obtained on request. Appropriate officers are available in main dairying districts and they should be consulted for on-the-spot advice.

[CONCLUDED.]

* * *

There's Good Feed Here

A Herd of Dairy Cows Strip-Grazing Spray-Irrigated Pasture in the Beaudesert District.

Monto Dairymen Show Profit From Herd Recording

By H. G. DOUGHERTY,
Dairy Officer.

DURING the first couple of years, the benefits gained from herd recording are small when compared with the gain in future years. Farmers in the Monto district, who have recorded their herds for a number of years, have shown that increased production per cow through herd recording has made their labours worthwhile.

TABLE 1

No. of Years Recorded.	No. of Herds.	No. of Cows.	Production.	
			Butterfat.	Commercial Butter.
1 and 2	15	963	130	157
3	3	182	143	172
4	6	379	188	227
*1st year recorded	6	353	138	166

* The first year's averages for the four years group are included at the bottom for comparison.

Cows recorded for four years have an average return of £37 to the farmer with commercial butter valued at 3s. 3d. a lb. This return is £11 8s. greater than that obtained from cows recorded 1 and 2 years. Their average return is only £25 10s.

In an average herd of 50 cows, the annual income has been increased by £570. Herd recording fees would cost £25.

Mould Future Herd

The aim of herd recording is to provide farmers with information which will enable them to mould a future herd of high-producing cows. A mature cow that produces over 200 lb. of butterfat per lactation is considered desirable. If she produces less than 150 lb., replacement should be sought.

Farmers who have recorded for a number of years have been able to do this, as shown in Table 2. During the first year of recording a majority of cows are considered to be in the unprofitable range while very few are considered profitable. The remainder producing from 150 to 200 lb. are considered paying boarders.

After 4 years' recording, almost half of the herd is listed in the profitable group. The increase in the number of cows over 300 lb. should also be considered. In herds recorded for 1 and 2 years, only one cow in 320 produced over 300 lb. butterfat. After 4 years recording this average is reduced to 1 cow in 34½ in this high production range.

TABLE 2

Years Recorded.	No. of Cows.	Profitable Over 200 lb. Butterfat.	Unprofitable under 150 lb. Butterfat.	Over 300 lb. Butterfat.
1 and 2	963	86 (9%)	697 (72%)	3
3	182	35 (19%)	105 (58%)	5
4	379	184 (49%)	79 (21%)	11
During 1st year recorded	353	49 (14%)	229 (65%)	1

After 4 years' recording, the number of unprofitable cows has been reduced to 21 per cent. This compares very favourably with 72 per cent. for herds recorded only 1 and 2 years.

Farmers who are recording continuously have, over the years, gathered information and built up their records on each member of the herd.

They have learnt that a cow's value cannot be judged on one or two lactations; it is her lifetime production which shows up her true value. She should also be able to transmit these production qualities to her daughters.

Cow families have been found to be the method of building up a good herd. Complete family records obtained from continuous herd recording can make this possible.

Many farmers in Queensland have used herd recording to great advantage. It has enabled them to obtain greater production per cow, per acre and per unit of labour. To obtain these advantages, adequate records are essential. The information supplied must also be understood and used correctly. Your local Dairy Officer can assist you with any problems which may arise.

The secrets for success through Herd Recording are; maintain adequate records, use information correctly, and, above all, record your herd continuously. With the service given by the Herd Recording Branch, the records required by the farmer are simple and easy to keep.

* * *

Keep Diesel Fuel Clean

Grit in diesel fuel means rapid and unnecessary wear in your engine. For trouble-free running and long engine life, clean fuel is the first requirement.

Filters between the fuel tank and the injectors cannot offset initial carelessness. Wear begins once dirt reaches the injector mechanism. A small amount of grit will soon cause sufficient wear to impair the performance of the engine.

To help prevent trouble from grit in the fuel, start first by keeping your storage tank clean and covered. Refuel through a hose carefully wiped clean with a fluff-free rag, and always use a clean filter funnel with a fine mesh strainer. Don't empty the storage container completely; the dregs are almost certain to contain harmful impurities. Check the fuel filter regularly and clean or replace the element when necessary.—*C. G. WRAGGE, Agricultural Engineer.*

You can help your cows to make more profits

By D. K. HOGAN, Dairy Officer.

EVERY dairy farmer knows that, due to increased labour costs, he has been forced to do more and more work himself. The stage has been reached where one man is trying to do the work of two. This is an earnest endeavour to cut production costs. But evidence of its failure is, in some cases, most noticeable by the lower grades obtained at the factory for the product.

These low grades are due mainly to neglect and hurried cleansing methods in the dairy. This fault is far from isolated, it may be found in any part of the State and is directly related to management.

In this, the farmer can do a lot to help himself, and at the same time, help his cows to make more profits. He should try to reduce his costs by deleting unnecessary dairy chores and paying more attention to the things that really matter.

More Return From Same Work

One of the first essentials of an efficient, profit-making dairy farm is that each cow in the herd should be a working member. Most herds carry at least one-third loafers. Continuous herd recording is the only method by which to be certain that each cow is producing to her worth in the herd. This could be the first step in decreasing production costs by increasing the unit of production per cow. It simply means that more return is gained for the same labour.

Let us next look at the general management in the milking shed. Are the machines milking quickly and cleanly? Is it wholly necessary to strip the cow after the machine? Do you have enough units to keep the operators fully occupied and so milk in as short a time as possible? Do you start the cow before you put the machine on, so as to obtain the milk quickly and reduce or eliminate stripping?

Only a small percentage of Queensland's milking machines are replaced each year, and so their age is up to 15 or more. Many of the machines have been checked over, but there are still a large number to be done. It must be remembered that a machine must be in first class order to do its work properly.

The efficiency of a machine does not have to drop very much for it to take an extra minute to milk each cow. In a herd of, say, 50 cows this represents 450 hours for each lactation period, with the added possibility of udder troubles.

Save Stripping Time

Stripping after the machine is a very controversial subject; some believe in it, some don't. It all comes back to the efficiency of the machine and the correct training of the herd.

With a modern efficient machine, and the herd properly handled, stripping is unnecessary. It, too, is a time-waster. A herd of 50 cows hand stripped twice daily over a normal lactation period can cost the farmer 900 hours' work. This is allowing two minutes to strip each cow each milking. It has been found that this is close to the average time taken by a large number of farmers.

Starting each cow by washing and massaging the udder to stimulate a complete milk let-down is time well spent. While this is being done, each quarter can be tried with a strip cup to detect any signs of disease. Neglect of this practice allows disease to obtain a stronghold before treatment takes place; thus the production life of another cow is lost.

Getting the cow's milk down in this way has three good effects: Firstly, quicker milking is obtained; secondly, the milking is more thorough; thirdly, with these two factors working for you, stripping is not necessary, because the cow gives all the milk to the machine.

Suitable equipment is another time-saver in the dairy. Most farmers struggle on for years without a suitable hot and cold water supply at the dairy. Some even carry these commodities long distances. This is far from necessary in this mechanical and enlightened age.

Hot and Cold

If a plentiful supply of hot and cold water is not available at the dairy, cleansing of machines and utensils suffers to the detriment of the cream grades, not to mention the time wasted trying to wash with lukewarm water.

The average dairy farmer is hard-working, and like any other worker, is entitled to a holiday each year. This can be arranged with good planning and management.

Confined bulls and seasonal calving on cream farms allow the farmer a break during the year; he may take a vacation or do farm maintenance work. The cows can be all out at one time of the year, during that period best suited to the area. Seasonal calving is gaining in popularity and is one of the most forward steps accepted by the industry for some years.

Short cuts in industry and study of efficiency in management are not new. Some of the largest food-producing factories employ men fulltime to do nothing else but to find methods to cut the cost of production.

By adapting new practices and giving more thought to their daily work, as far as management and production of the dairy farm is concerned, the dairyman will gain two-fold: initially, by higher production per cow through herd recording, therefore more income for the same labour; and again, by a better quality article being produced. This is due to more time being available for essential cleansing, rather than being spent on unprofitable and irksome chores in the milking shed.

These few items of dairy practice are worth a try. Have your milking machine checked by your Dairy Officer. Begin to train your cows to non-stripping as they calve. Wash the udders well for stimulation before using the machine. Use the strip cup to detect disease.

Plan your cleansing so as to do it thoroughly and easily, in the shortest time.

Make certain that you have plenty of hot and cold water. Lock up that bull, and do something about having a holiday. Generally organise your shed routine to make the job easier.

Evidence Favours 4-9 Weeks' Dry Period For Dairy Cows

By **C. H. CLARK**, Dairy Adviser.

Evidence from surveys of production-recorded cows indicates that cows with dry periods of 4 to 9 weeks have higher production than cows with longer dry periods.

Opinions vary considerably on the period a cow should be given between calving dates. The ideal length of her dry period is also discussed frequently. The Herd Recording Section has attempted to provide information on these aspects by examining records of calvings. During the investigations, records of 20,000 cows which completed lactations in 1955-56 were computed, together with the records of 26,000 and 13,000 cows which completed their lactations in 1956-57 and 1957-58, respectively.

Periods between calvings and lengths of dry periods of cows were examined in relation to their productions in the subsequent lactations. A summary of data on the period between calvings is given in Table 1.

It may be seen that the percentages of cows according to their calving intervals remained fairly constant in each of the three years of the survey. These figures are expressed in another way in Table 2. In this table the period between calving has been expressed according to the time of conception.

Then it appears that, on the average, approximately 90 per cent. of our recorded cows calve at intervals of 10 to 14 months. The cows which calve in the 10 months period (18 per cent. of recorded cows) go in calf on their first heat period. About half of the cows conceive on the 2nd to 4th heat period, while the 4th to 6th heat period is the time of conception for about ⅕ of the cows. Cows which re-calved at 15 months or more were probably affected by a disease which reduced their fertility.

Except in the 1955-56 year, the period between calving did not seem to influence the production of cows during their following lactations. In the 1955-56 year, cows which had a period between calving of 10 months produced approximately 10 lb. butterfat less than cows which re-calved at intervals of 11 to 14 months.

In the 1956-57 year the average length of dry period of cows was tabulated according to their period between calving. The result is expressed in Table 3.

TABLE 1

PERCENTAGE OF COWS CALVING AT VARIOUS PERIODS AND THE AVERAGE PRODUCTIONS OF THEIR SUBSEQUENT LACTATIONS.

Recording Year.	Period Between Calving (Months).								
	10			11			12		
	% Cows.	Av. Milk.	Av. Fat.	% Cows.	Av. Milk.	Av. Fat.	% Cows.	Av. Milk.	Av. Fat.
1955–56	19·4	3,685	160	25·5	4,421	175	28·3	3,971	171
1956–57	16·2	3,635	153	26·0	3,732	158	27·2	3,774	161
1957–58	18·0	3,494	143	25·9	3,594	148	26·6	3,697	153
Totals 1955–58 ..	17·7	3,621	154	25·8	3,930	161	27·4	3,825	163

Recording Year.	Period Between Calving (Months).								
	13			14			15–20		
	% Cows.	Av. Milk.	Av. Fat.	% Cows.	Av. Milk.	Av. Fat.	% Cows.	Av. Milk.	Av. Fat.
1955–56	10·2	3,918	170	6·2	3,724	169	10·3	3,977	172
1956–57	12·9	3,778	161	7·3	3,723	159	10·2	3,738	158
1957–58	12·7	3,723	153	7·1	3,654	150	9·8	3,619	151
Totals 1955–58 ..	11·9	3,805	162	6·9	3,707	160	10·2	3,795	161

TABLE 2

PERIOD BETWEEN CALVING AND TIME OF CONCEPTION DURING 1955–58 YEARS.

Period between Calving Months.	Time of Conception.	Percenage of Cows.
10 ..	1st heat period ..	18
11 ..	2nd heat period ..	26
12 ..	3rd or 4th heat period	28
13 ..	4th or 5th heat period	12
14 ..	6th heat period ..	7
15 or more	7th heat period or later	9

TABLE 3

PERIOD BETWEEN CALVING AND LENGTH OF DRY PERIOD 1957–58.

Period between Calving (Months).	Average Length o Dry Period (Months).
10	3
11	3
12	3¼
13	3½
14	4
15 and over ..	4½

An examination of the figures in this table indicates that the average length of dry period of cows which had a calving interval of 12 months was much the same as that of cows which calved in 10 or 11 months. Although the average length of dry period is fairly constant in each case, a critical examination of the figures, as in Table 4, shows that the actual length of dry period affects production during the following lactation.

TABLE 4

Effect of Length of Dry Period on Production 1955–58.

Length of Dry Period (Weeks).	Percent- of Cows.	Average Milk lb.	Average Butterfat lb.
1– 3 ..	2·4	3,854	168
4– 6 ..	9·0	4,179	181
7– 9 ..	20·7	4,078	176
10–12 ..	25·9	3,916	167
13–15 ..	14·2	3,745	157
16–18 ..	14·1	3,531	148
19 and over	13·9	3,246	137

As the length of dry period increased beyond 6 weeks the average production per cow decreased. Table 3 shows that the cows in the 1957-58 year had an average dry period of 3 months or more irrespective of the calving interval. This is also reflected in the figures for the three years which are given in Table 4. That is, about 60 per cent. of cows had a dry period of 1–12 weeks and approximately 40 per cent. were dry for 13 weeks or more.

Possibly, the length of dry period of our cows is too long and productions would be better if their length of lactation was increased and a dry period of 4 to 9 weeks only was maintained.

A summary of the survey is as follows:

(1) Information from herd recording results shows that the period between calving for 90 per cent. of cows during the 1955–58 period was 10 to 14 months. Many of the remainder were probably affected by a disease which reduced their fertility.

(2) Except in one year, productions of ensuing lactations were not affected by periods between calvings.

(3) The length of dry periods of cows varied slightly according to the calving interval.

(4) It appears that most cows have an adequate length of dry period. Productions during their following lactations seem to be affected by very short or long dry periods.

(5) The average length of lactations appears to be too short. Longer lactations and shorter dry periods would result in increased production per cow.

Keep Your Tyre Costs Low

The basic principle of the pneumatic tyre is that the load imposed on it is supported by the air within the tyre. A tyre is therefore built to certain dimensions, together with requisite tensile strength which is expressed in ply rating to withstand the air pressure required.

For maximum efficiency a tractor or implement tyre must be used at the deflection for which it was designed. The correct deflection is obtained by keeping to the pressure recommended in the instructional manual by the manufacturer of the tractor or implement.

These pressures should always be used and regularly checked in order to ensure the best possible tyre performance. Both under-inflation and over-inflation are exceedingly costly errors. Correct deflection is essential for maximum tyre efficiency, longer life, and lower overall costs.

—*C. G. WRAGGE,*
Agricultural Engineer.

Bucket and Bail

Reduce Risk of Bloat—Spraying tallow on pastures and suitable pasture management together offer the best protection against bloat yet tested in Queensland. But these measures will only reduce the incidence and severity of bloat; they won't eliminate the danger completely.

Spraying pastures with tallow has shown great promise in preliminary tests. Two to three ounces of tallow a cow a day is sprayed on the pasture and the cost is 5s. to 7s. a cow per month.

But since pasture spraying can't be guaranteed to prevent bloat altogether, this measure should be combined with pasture management. In pasture management, aim to keep the legume content of the forage below 50 per. cent. of the total bulk. Strip grazing, which forces the stock to eat the more fibrous stalks as well as the succulent tops of the legume is also an aid.

—D. N. SUTHERLAND,
Director, Cattle Husbandry.

Plan Now for August—Commence training heifers to ensure good milk let-down.

Tattoo calves for future identification.

Control grazing on weed-infested paddocks to minimise milk taints.

Join a Herd Recording Group now to find out which cows are profitable.

Overcome low fat milk by correct feeding. Consult your dairy officer.

Graze springers on good pastures and crops.

Ropy Cream can be Prevented—Farmers who have to depend on dams or creeks for watering their stock are often troubled with ropy cream. Cream in this condition is down-graded, and this reduces the farmer's income. The trouble is caused by water-inhabiting bacteria.

Cows pick up the troublesome bacteria on their flanks and udders when they wade into dams or waterholes to drink. The bacteria are found in most stagnant waters. Sometimes they get into the tank attached to the dairy shed.

Attack the problem first by fencing off all dams and lagoons to prevent the cows wading in, and water your stock at a trough. If your water tank is concreted inside, chlorinate the water. Always chlorinate the cold water you use in the dairy, and be sure that the water you use for sterilizing is actually boiling.

—N. E. FOWLER, Dairy Officer.

Dealing with cowpox—Although it's a mild disease, cowpox can be really troublesome in a dairy herd. It causes soreness of the udder and teats and upsets the cows at milking time. Usually heifers being broken in are affected, and their unruliness can sorely try a milker's patience.

The disease begins with small, hard, tender swellings on the udder and teats. These develop into pustules. Raw, inflamed ulcers that heal slowly are formed if the pustules are broken. The ulcers may become infected, and if the bacteria move up the teat canal, mastitis may result.

Cowpox usually clears up in about 10 days. The animal is then immune for life. However, affected cows should be milked last, and by hand. This treatment should be applied at all milkings until the disease clears up. If the sores break, keep them clean with dilute antiseptic and dust them with sulphanilamide or penicillin powder.

—S. G. KNOTT,
Divisional Veterinary Officer.

What the producer should know about insecticides and miticides

By B. R. CHAMP,
Entomologist.

INSECTS and mites reproduce themselves in large numbers to ensure survival. The offset this they are subject to natural control by extremes of temperature, unfavourable rainfall and humidity, as well as parasites and predators.

In many instances this control does not protect crops at an economic level, and must be supplemented by the use of insecticides and miticides.

These chemical controls should be regarded as short-term measures and should interfere as little as possible with natural controls.

Most insecticides and miticides in common use today are contact poisons which kill parasites and predators as well as particular pests. Unfavourable sequels to use of the materials are resurgences of the pest in the next generation or in succeeding seasons; increases may also occur in the degree of troublesomeness of other insects and mites which are present.

The major factor in such happenings appears to be the destruction of beneficial insects and mites.

Pest Control Programmes

Treatments are timed so that the smallest dose of a poison may be used against a pest at its most susceptible stage, and before infested material has been damaged appreciably. This requires an accurate knowledge of the biology of the pest species concerned, which, with consideration of natural control factors, enables a programme of treatment to be drawn up for the use of the producer who is troubled by pest and mite damage in his crops.

In assessing pest kills, it should be remembered that there is often a considerable time lapse between treatment and death. As examples, large caterpillars may continue feeding for 12 to 24 hours after intake of a lethal dose; four weeks may elapse before dead and alive red scale can be recognised as such, and up to six weeks before a final estimate can be made.

Again, with some insects and insecticides, treatments applied just before pupation will not result in either disability or death until some time during the pupal stage or when the insect emerges as the adult form.

Susceptibility to chemical treatment of many pest species varies both within and between different stages of development. This may be due to differences in physiological state—as between small and large caterpillars of the same species—or differences in availability of poison, as with certain scale insects which at particular stages of development have relatively insecticide-impervious coverings.

In addition, generations in many pest species overlap. Where such patterns exist, a number of applications will be necessary to ensure adequate control.

The interval between these is adjusted so that the first coincides with the peak occurrence of the pest in the susceptible stage, and follow-up applications deal with those individuals which were not in a susceptible state when the early treatment was applied. Control of red scale with white oil is an example of this type of treatment.

When the species being controlled has an active free-living stage and a short life cycle or indefinite breeding period, control will be of little use unless measures can be taken to prevent reinfestation. The residual properties of certain insecticides and miticides are of value but often give inadequate protection where injurious stages of the pest feed within the treated material.

For economy, most spray programmes are designed to reduce pest incidence to proportions where further control is not justified. Knowledge of the biology of the species will determine when and if further measures should be taken.

Some species appear fairly regularly in certain seasons, particularly in temperate zones, and control programmes become routine. Others appear spasmodically and control is not always required. In all instances, however, timely inspections are necessary for economic use of pesticides.

Sometimes a number of species is involved in pest outbreaks. Then, if possible, a material and method to deal with all the pests should be used.

In commercial practice, control programmes must be interpreted by the user and his technical adviser with due regard to local conditions.

Toxicity to Bees

Many insecticides, particularly BHC and the arsenical and organophosphate compounds, are extremely toxic to bees. Pest control programmes should be designed to interfere as little as possible with the activity of these beneficial insects.

In the first instance, however, it must remain the responsibility of the progressive beekeeper to familiarise himself with pest control programmes in use in his district and adjust his activities accordingly.

Compatability of pesticides depends on formulation as well as stability of the active ingredient. With the diverse range of formulations marketed, the onus for compatability recommendations must rest with the formulator and distributor.

"Resistance" to Pesticides

"Resistance" to pesticides has been recorded in insect and mite species in many countries following the use of most organic pesticides. The correct term is acquired "resistance" of a population (as an increase in resistance over that natural resistance present before exposure to pesticides) and represents an increase in the proportion of resistant individuals present in successive generations of the population by survival of "resistant" strains.

The high order of resistance of these strains is inherent in the species and occurs normally in an extremely low proportion of individuals.

The mechanisms of "resistance" are by no means clear, but certain well-established features enable planning of effective counter measures.

1. The development of "resistance" to one particular pesticide confers on insect and mite populations a measure of high level "resistance" to related pesticides.

Low level resistance to unrelated series of pesticides may also be developed concurrently.

2. Where "resistance" to a particular series of pesticides has been developed, these tolerant populations will develop high level "resistance" to unrelated series with greater facility than would populations previously unexposed to pesticides.

3. "Resistance" in field populations is lost on removal of the populations from exposure to pesticides. The rate of loss depends on the intensity of selection for "resistant" strains and dilution by individuals of normal susceptibility from unexposed populations. If intensive selection has continued from large-scale use of materials at high concentrations, loss of "resistance" will be very slow and in exceptional instances stable "resistant" strains may be produced.

Replacement

Where "resistance" to pesticides has been observed, the pesticide in use should be replaced by one of an unrelated series and attention given to efficient utilization. This change in the pest control programme must be planned recognising the liability to further development of "resistance" and the availability of reserve types of pesticides for emergencies (the latter applies particularly where pests involved are vectors of human and animal diseases).

The occurrence of "resistance" in plant-feeding insects and mites is related frequently to excessive use of pesticides. Chemicals are often applied as a form of crop insurance, and, in other instances, mixtures of chemicals are used where one would suffice. These practices must be kept to a minimum if continued pest control is desired.

No authentic instances of "resistance" in insect and mite species of either agricultural or horticultural importance have been reported in Queensland.

Breakdown of controls due to any of the following factors does not constitute true "resistance":

1. Use of pesticides that have deteriorated in storage.

2. Incomplete coverage of material due to inadequate equipment or treatment. When pests are in plague proportions, survivors may be sufficient to cause considerable economic damage.

3. Use of unstable preparations, and disregard of compatibility recommendations.

4. Variations of pest susceptibility with temperature. Dosage levels effective at normal temperatures may be inadequate during extremely hot or cold weather. With certain species, humidity can have a similar effect although to a somewhat lesser extent.

5. Under conditions of extremely hot weather and intense sunlight, pesticides may be decomposed or otherwise lost at abnormally high rates.

Control of Usage

Many compounds with insecticidal or acaricidal activity have been developed. The greater proportion of these has not appeared on the market and few have shown properties superior to materials in common use.

All these compounds are toxic in some degree to man and livestock and considerable health hazards may exist in handling and application, and from persistent residues. With the limited knowledge available of the hazards associated with pesticide use, particularly with regard to long-term, low-level exposure, it is not in the public interest to allow indiscriminate use of these chemicals. This is supported by (1) considerations of interference in natural controls of pests; (2) the possibilities of development of "resistant" strains; (3) the role of formulation of the active material in the efficacy of a treatment; and (4) the adverse effects of particular formulations on the material being treated, for example by phytotoxicity, tainting, and staining.

In Queensland, sale and use of pesticides are regulated by provisions of *"The Agricultural Standards Act of* 1952" and *"The Health Acts,* 1937 *to* 1947." These provisions enable responsible authorities to ensure that all products offered for sale have a specific role in pest control under local conditions, that label claims are accurate, and that health hazards are at a desirable minimum.

Formulations

Formulations of insecticides and miticides are described as follows:—

Concentrates. This category includes all compounds, solid and liquid, used in the commercially pure form. Paradichlor-benzene and naphthalene are examples.

Concentrate Solutions. These are prepared by taking up the active ingredients in solvents which are usually inert. Some solvents, however, have slight pesticidal properties, for example, diesel oil and kerosene. Concentrate solutions may be used as paints, sprays, and dips, and in suitable vaporising or dispersing equipment to produce the finely divided, liquid-in-air suspensions known as mists and fogs.

Aerosol Preparations. Aerosols are relatively stable air suspensions of solid or liquid particles of submicroscopic size. These are used in treatment of enclosed areas such as glasshouses and buildings, and more recently for large-scale spraying outdoors where conditions are suitable.

In the liquified-gas method of producing aerosols, active material is formulated in a low-boiling solvent held under pressure in a suitable container. When released, the contents are ejected as a fine spray from which the propellent solvent immediately vaporises leaving a finely divided air suspension of active material. Carrier non-volatile oil is added to the solvent to determine particle size of the suspension. Common propellents are Freon 11 and 12, methyl chloride and propane.

Insecticidal smokes are produced by combustion of solid flammable preparations containing active material. Because of the large losses of active material involved in this method, smokes have never come into extensive use.

Various modifications of vaporising and dispersing equipment used to produce fogs from concentrate solutions have been developed to enable these solutions to be used for aerosol spraying.

Emulsifiable Concentrates. An emulsifiable concentrate contains an active ingredient, an appropriate solvent and if necessary an emulsifying agent for readily dispersing the insecticide solution as a suspension in water. Modern emulsifying agents usually possess wetting and sticking properties and are adjusted for use in hard or soft water areas. Other additives, however, may be required when the surfaces to be treated are thickly wax-covered and water-repellent.

With certain insecticides, stabilizers are necessary to prevent deterioration of active ingredients when concentrates are held in storage.

Emulsifiable concentrates are the common formulations and are usually used by diluting to required strengths with large volumes of water. For low-volume spraying, a minimum of water is used and in air-assisted methods a high velocity air stream acts as the bulk carrier.

Emulsion Concentrates. Emulsion concentrates are emulsified preparations of concentrate solutions in which the water carrier has been reduced to a minimum for storage and transport purposes. These have a cream-like texture and after primary dilution, disperse readily in water.

Emulsion concentrates and emulsifiable concentrates have similar applications, but the former are considerably cheaper to produce as a minimum of solvent and emulsifier is used.

Special formulations have been developed for low-volume spraying so as to obviate nozzle blockage which occurs when flow of spray liquid is interrupted.

The consistency of an emulsion concentrate is not related primarily to its composition but is determined by the amount of homogenising given by the formulator; this is adjusted to suit consumer requirements.

Emulsion concentrates are not stable over long periods of storage and extremes of temperature, as the emulsion may break and release free concentrate solution from which the solvent evaporates. Stabilizers may be added to delay this tendency. Because of lower solvent content, emulsion concentrate sprays, when fresh, are less toxic to plants than sprays made from emulsifiable concentrates.

Miscible Oils. These are a limited range of formulations in which the solution of insecticide mixes directly with water without formation of the suspension found in emulsions. A wetting and spreading agent is usually necessary to ensure adequate coverage of treated surfaces with a limited affinity for water.

Dispersible and Wettable Powders. In instances where liquid formulations of active materials are not practicable or for reasons of solvent phytotoxicity use of emulsified preparations is undesirable, suspensions in water of solid particles impregnated with active material may be substituted. These suspensions are prepared from dispersible and wettable powders, that is, finely ground solid materials to which dispersing and wetting agents have been added. The finely ground materials may be active ingredient alone, as, for example, sulphur, or if the active ingredient can be taken up in volatile solvents the toxicants are impregnated on high-grade dust diluents. Wettable powders are less finely ground than dispersible powders, contain a minimum of wetting agent, are comparatively difficult to disperse in water, and settle readily.

Dispersible and wettable powder formulations when used near harvest have the disadvantage of leaving residues frequently visible, and in excess of those obtained from all-liquid treatments.

Dusts. Dusts are dry, finely ground preparations of active ingredient either undiluted or diluted with suitable carriers to extend coverage, reduce phytotoxicity and /or alter physical and chemical properties of the final product. Carriers may be inert or may exhibit a degree of insecticidal activity.

Dusts are prepared by either physical or chemical impregnation of carriers or by mechanical blending of finely divided active material with diluent. Carriers are classified according to their absorptive capacity, and frequently dust formulations are based on impregnatnon of a primary absorptive material (for example, bentonite or botanical flour) followed by mechanical dilution with a relatively low absorptive carrier (for example, pyrophyllite).

The size of dust particles is related inversely to biological activity and affects susceptibility and carrying power in air. The shape influences flowability, adherence to surfaces, and uniformity of mixing. The density of the individual particle controls carrying power and settling properties in air. Finally, hardness of dust particles together with size and shape determine their abrasive properties, which are particularly important in dusts formulated into dispersible or wettable powders, as the diameter of outlet orifices in nozzles is of critical importance. Bulk density and flowability are important properties which are determined by the previous factors and other considerations such as age of the formulation and packing and handling methods.

Dusts are used extensively in the protection of stored and bagged products, and in the field where ease of handling is an important consideration.

Granulated Insecticides. These are large particle, dry formulations suitable for control of some soil-infesting insects. They may be applied with conventional dusting equipment. The particles do not adhere to dry surfaces and will penetrate through heavy leaf cover to the soil beneath.

Application Methods

The first essential for efficient spraying and dusting is adequate coverage, which must be accomplished with least loss of material from run-off and drift. Details of methods depend on the pest to be controlled, the crop to be protected, the most suitable insecticide for the purpose, equipment and capital available, and nature of the terrain. Each method must be evolved for its own circumstances.

All liquid spraying methods are distinguished by the volume of spray applied, and the methods of application are classified as lance, automatic hydraulic and air-assisted spraying.

In *Lance spraying,* hand-operated spray lances with either fixed or adjustable nozzles are used for individual treatment of trees in orchards, or in some ground crops.

Automatic hydraulic methods involve fixed arrangements of spray nozzles either as spray booms for field crops, or in suitable combinations for row crops and in orchards.

Air-assisted spraying has increased in popularity both for high- and low-volume applications. It is essential for low-volume work in orchards, either as air blast spraying using 50 gal. to the acre, mist-blowing using 20 to 35 gal. to the acre, or concentrate spraying using 3 to 6 gal. to the acre.

Machines available for air-assisted spraying are of three types:

In the first, air speed is approximately 100 m.p.h. and a large volume of air is used which in theory replaces the air within and about the treated tree. This type of machine can apply from 30 to 500 gal. to the acre and usually requires a separate power unit.

In the second type, air speed is increased to 150 m.p.h. and air volume reduced considerably. Spraying rates are from 20 to 250 gal. to the acre and power take-off drive is sufficient.

In the third type, an air speed of 250 m.p.h. is used, delivering from 3 to 50 gal. to the acre.

The latter types depend on complete mixing of insecticide-laden air with the air within the trees.

Allied to the low volume air-assisted "misting" machines are the fog generators. These produce a smaller sized particle, usually in some form of heat generator. Fog generators depend to a large extent on air currents for dispersion. For small crop and plantation use, portable low-volume equipment is available.

Particular methods adopted depend to a large extent on personal preference, though the present world tendency is to low-volume spraying and its end point, concentrate spraying using particles in the mist size range (fogs have a smaller particle size and do not give satisfactory deposits). This has been brought about by increasing costs and shortage of labour and the associated saving of time. In severe infestations, however, high-volume methods are found necessary and current work indicates that deposits from these high-volume applications have a greater residual life than those obtained from low-volume methods. Low-volume methods are unsatisfactory in orchards and ground crops where dense cover is encountered, and if these methods are to come into general use, agriculturists and horticulturists must modify their cropping procedures accordingly.

Dusting, essentially an air-assisted method, is popular for certain crops. Dust particles penetrate heavy foliage better than spray droplets, and treatments are considerably easier to apply. Losses due to drift, however, are great and electrostatic and spray-coated dust methods have been developed to improve coverage and retention. These methods have found limited use.

Aerial spraying and dusting methods have a definite place in pest control practice, enabling large areas to be treated rapidly and economically.

Aerial treatment is a contract service and has the advantage of eliminating many preparatory tasks necessary for pest control by the farmer and orchardist.

Other convenient aspects include saving in labour requirements and use of trained operators in application of dangerous materials. Treatments can be applied when land-based equipment cannot be used, though difficulties may arise in seasonal treatments particularly after interruption by adverse weather, the demand greatly exceeding availability of the interrupted services. For this reason, some adequate conventional equipment should be maintained when using aerial contract services, particularly if treatment times are critical.

Airplanes appear at present to be the practical proposition, as helicopters, though potentially superior, represents a considerably higher capital outlay and have very high running maintenance costs.

It should be appreciated that the level of control from aerial spraying and dusting methods is in most instances inferior to that obtained with conventional equipment and in many instances is completely unsatisfactory (for example, in tobacco). These methods should be used only after careful consideration of all factors involved.

Insecticides are used also for *soil-inhabiting pests,* the active material being either incorporated directly into soil or premixed with fertiliser.

Seed dressings with dusts or dispersible powders find application in control of pests of newly sown and germinating seed. Methods for use of *systemic insecticides* and *fumigants* will be discussed in later issues.

Protect Pigs From Scours ...And Save Money

By **G. W. OSBALDISTON,**
Assistant Husbandry Officer.

Two previous articles on scours in young pigs have appeared in the Journal this year, the first, on the causes of scours, being printed in January, and the second, on treatment, in February. This present article points to economically sound measures for the prevention of the complaint.

The causes of scours and recommendations for their prevention, may be summarised as follows:—

Cause.	Prevention.
A Filth-borne diseases	Improve sanitation, accommodation and hygiene.
B Nutritional disorders— (i.) From deficiency	(*a*) Allow the sow and litter frequent access to parasite-free pasture when the litter is 5 to 7 days old. (*b*) Sprinkle ferrous sulphate on the floor of the farrowing pen when piglets are a few days old or place a clod of clean earth in the pen. (*c*) Administer iron to the mouth of the piglet. (*d*) Inject iron into the body cavity of the piglet.
(ii.) Digestive disorders— (*a*) Sudden overfeeding of a sow that has a weak unthrifty litter (*b*) Allowing starving piglets access to lush pasture (*c*) Sudden alteration of the composition of the piglet's feed	Improve management practices.
C Lowered resistance of the piglet . .	Improve accommodation

What Can You Do?

The old adage, "prevention is better than cure," very aptly fits the scour problem and only the pigman with poor sow and litter accommodation, or a poor sanitation programme, is seriously involved. Scours can occur on any piggery and in any season but on the better piggeries they are due only to altered management practices and consequently are usually only temporary.

The recommended method of prevention is to build good accommodation and to keep it in inspection order.

In most cases, the cheapest and best way to solve the problem is to build new sow and litter pens. Most farmers consider this uneconomic and so they keep the problem alive with makeshift alterations. The main objection to building new pens is the fear that the added return due to the better growth of the pigs reared will not justify the capital involved.

Does the increase in efficiency and the number of pigs reared compensate the cost of the increased production?—The immediate capital cost alarms some farmers because they fail to consider the advantages of better accommodation. The main advantage of good accommodation is increased profit from the pig enterprise. Do the increased profits counterbalance the capital involved? Only the farmer can answer that question for himself. A way to solve the problem is given later in this article. However, farmers can be reassured that where suitable sow and litter pens have been built, the returns have more than compensated the outlay.

Scouring affects the piglets in the following ways:

(1) Loss of condition and strength—as scouring increases in severity this becomes more pronounced.

(2) Poor growth—if severe, there may be loss of weight.

(3) Loss of appetite—starvation if severe.

(4) Inefficient digestion of the food consumed.

(5) Death—due to filth-borne bacteria or starvation.

By eliminating baby pig scours from the piggery, more piglets per sow are reared and they are more likely to develop into thrifty animals. Therefore the cost of production of each pig marketed is reduced and more pigs are marketed.

Consider The Economics

The net return from a piggery is the gross or total income less the cost of production. Gross income is dependent on the number of pigs marketed and the price realised by each pig. If the number of pigs marketed increases, the gross return will increase provided the price remains constant.

Cost of production will be considered in two phases:

(*a*) Running costs, for example, labour, feeding costs of the growers and,

(*b*) Maintenance costs, for example, feeding costs of the breeding herd, replacement of breeding stock, and depreciation of housing and equipment.

Irrespective of the number of pigs reared, the maintenance costs remain the same provided the size of the breeding herd remains the same. Thus if one, two or three piglets more were reared in each litter the maintenance costs of the pig enterprise would not be affected.

With good accommodation, labour costs will be minimised and work will be done with a more enthusiastic attitude. Few farmers consider time as shillings per hour, but any time saved on piggery chores means that more time is available for other work on the farm.

The total cost of growing pigs is dependent on:

(*a*) The cost of the foodstuffs,

(*b*) The quantity of foodstuffs fed,

(*c*) The number of pigs.

The quantity of foodstuffs fed is influenced by the efficiency of utilisation, or digestion, and the time taken to grow to market weight. The longer the pig takes to reach market weight, the more food it consumes and so the more it costs to produce.

Research has shown that from the viewpoint of feed efficiency, healthy thriving weaners generally grow into efficient quickly growing animals. Thus the healthy weaner costs less to grow to market weight. As "the scours" results in unthrifty weaners, the prevention of this disease will give enhanced profits.

The number of animals weaned per litter will increase with good housing, management and feeding, and so more animals will be marketed. This is a particularly important point, because a farmer is only paid for the animal that he markets and so the more animals that he sells the greater will be his gross return. If the average cost of producing a bacon pig is less than the return for the pig, then the greater the turnover of pigs the greater is the total profit.

The net return is, therefore, dependent on three factors:—

(*a*) Market value of the pig;

(*b*) The turnover of pigs, that is, number of pigs marketed;

(*c*) Cost of production of a pig.

With improved accommodation and sanitation, the effect on an income and expenditure account for a piggery would be as shown in Table 1.

TABLE 1

INCOME AND EXPENDITURE ACCOUNT.

Expenditure.	Income.
Labour costs—reduced Feeding cost per pig—reduced Maintenance cost—same Balance— increased profit	More pigs marketed—increase gross income
£1,000	£1,000

So far the approach has been theoretical. Each farmer must supply the information to fill in the income and expenditure account. The information to complete the account must come from farm records. So to make the decision as to whether an improvement in the accommodation of the present pig enterprise would result in an increased profit, accurate and reliable farm records are essential.

The records should show the following:

(1) Number of pigs born;

(2) Number weaned;

(3) Number marketed;

(4) Returns from pigs;

(5) Total food costs—

(i) of growing pigs,

(ii) of breeding stock.

These are simple records but they are essential to gauge the financial results of good accommodation. They will show that the increased profits which result from the greater efficiency and larger number of pigs reared will exceed the cost of obtaining this increased production. In other words, it is possible to predict accurately how much good accommodation and sanitation do pay.

Effects of Scouring

Considering a litter of eight pigs at weaning time in which three of the piglets were affected with scours, and weigh on the average 7 lb. lighter than their litter mates. Four or four-and-a-half months later, if the litter is examined, it will be found that the five healthy pigs at weaning are now ready for market and the three pigs affected with the scours are still 20 or 30 lb. off market weight. These three particular piglets must be kept on the farm for a few weeks longer and they are six-and-a-half or seven months old and consuming 6 lb. of food daily.

These piglets, affected by "the scours" when young, will cost 20s. or 30s. more by market time and so they have reduced profit by this amount.

Generally, piglets which suffer setbacks such as scours in early life, cost more to grow into a baconer than piglets which did not receive any setback. They are more expensive to rear because they require a longer period to grow to bacon weight.

Two factors affecting the profit of a pig enterprise are the rate of turnover and the cost of production of each pig. When pigs are slower growing than normal, they reduce the rate of turnover and they cost more to grow.

Thus "scours" have a definite influence on the profit of a pig enterprise, and always result in decreased profits.

New Treatment For Poultry Disease

Queensland veterinary workers have shown that the antibiotic drug, streptomycin, is an effective weapon against chronic respiratory disease in poultry.

The drug has been found to be of special value in treating the disease in layers, pullet chickens and growing cockerels. The birds are treated by injecting streptomycin into the breast muscle.

In five trials, treatment resulted in the disappearance of symptoms in most birds within two days. This improvement was accompanied by brightened appearance and increased appetite. When layers were treated, egg production commenced to rise four or five days later.

Chronic respiratory disease (C.R.D.) is widespread in Queensland poultry flocks. It reduces egg production in laying hens. In growing chickens, loss of weight is a common feature of C.R.D., and in young cockerels, the proportion of unmarketable birds is high.

Australorp pullets treated early in a C.R.D. outbreak laid 70 per cent. more eggs in the first month than untreated pullets. Production of the treated birds was also 49 per cent. higher in the second month and 6 per cent. higher in the third month. In two other trials, treated layers produced over 70 per cent. more eggs than untreated birds.

Pullets treated in the pre-lay stage started to lay at the same time as untreated birds, but laid 13 per cent. more eggs in the first 14 weeks of lay.

Treated cockerels gained ½ lb. more weight than untreated cockerels over a five-week period although they were all housed together. At the end of the trial, the market weight of the treated group was 16·7 per cent. higher than that of the untreated group.

—*P. D. RANBY,*
Veterinary Officer.

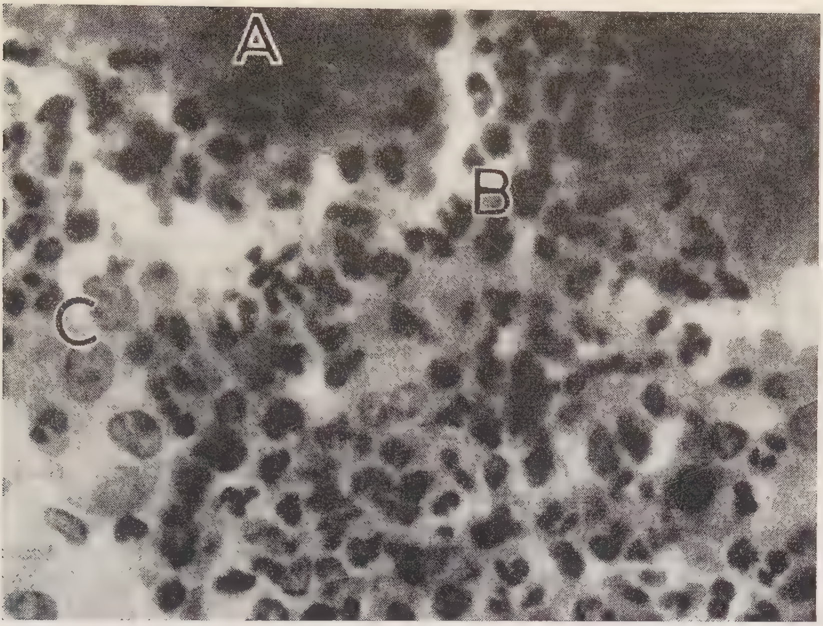

Plate 1: High Powered Photo-micrograph Showing the Battlefield in the Animal Tissue. Note: (A) The Invaders, which are masses of bacteria and debris; (B) The Defenders, which are the white cells, and (C) The Stretcher-Bearers, or phagocytes, as they are technically known.

The Unseen Enemy

By D. J. WEBSTER, Assistant Veterinary Officer.

The surgeon in his gloves and mask; a veterinarian taking your cow's temperature; or your wife pouring disinfectant down an evil-smelling drain. All these people are taking up the fight against that unseen enemy—the germ or microorganism. The story of this battle could read like a war novel.

Vho is He?

The air and the soil around us are nhabited by millions and millions of hese tiny organisms, too small to be een by the naked eye, but quite eadily distinguished under a microcope. Some of these germs are useful to man, such as the ones that convert fodder into silage, or the ones which live in the brewer's vats producing beer. Others live quietly along, harming no one and helping no one.

There are others, though, which, if given the chance, attack man, animals, and plants causing sickness and death.

These organisms which attack animals are called pathogens to distinguish them from their relations which do not. There are numerous forms of pathogenic germs and they come in all shapes and sizes. There are the bacteria, viruses, fungi, and protozoa. Each germ is usually a single cell which may be round or rod-like. They multiply by dividing in half and thus it may be realised why they are present in such large numbers.

Living Conditions

Like all living things, these germs require certain climatic conditions in order that they might survive and increase. A certain temperature and some moisture are their most important requisites. Many people when preserving foodstuffs will have had experience with these requirements of germs. Thus we boil preserves generally under pressure, to kill any germs. You will have noticed also, how well beef keeps if it is dried out thoroughly, or when it is salted. Possibly the salt acts by removing water from the bodies of the germs.

Where is He Found

We now have a picture of the enemy and how he likes to live. Now we may ask where does he live? There are, in general, two places where we may find these pathogenic germs. One is in the ground, and the other is in animals themselves. It is not usual for them to float around in the air for any length of time.

If they are on the ground they have a great enemy to contend with. This is the sun whose heat will kill them, and whose rays will also dry out the moisture they need for life. Some germs can, therefore, only survive in shady moist places. Others have adapted themselves so that they can withstand the sun's effects to some extent. One of these is the germ which causes tetanus. This organism can live for some time in the dry dust of yards directly exposed to sunlight.

Some germs cannot live on the ground at all. They prefer to live and multiply inside an animal's body. The animal concerned is not affected by the germs generally, because it has suffered an attack by them and developed what is called an immunity. It is called a carrier animal. Many of you will have read about "Typhoid Mary," the woman who spread typhoid fever wherever she went in the United States. She was a carrier of typhoid fever. Similarly we have carriers of animal diseases. The germs known as Salmonellas are spread by seemingly healthy animals. The disease known as paratyphoid or necrotic enteritis in pigs is spread in this way. Many poultry farmers will have had experience of pullorum disease and the tests carried out to pick up carrier birds.

Contagious pleuropneumonia and brucellosis, are spread in this way.

In a somewhat different class is tuberculosis. This is what we call a chronic or slow-moving disease. With this the animal does not become immune to tuberculosis, but because the disease moves so slowly it has time to spread the germs round among other animals before eventually dying.

Where and How They Attack

The animal body has a natural barrier to attack by these germs. This is the skin. But through necessity and sometimes by accident, there are breaks in the barrier; the mouth, eyes, nose, and cuts are vulnerable chinks. Some germs are swallowed in the food. Others are breathed in and some may invade cuts or breaks in the skin. So an infection, as we call it, begins.

As has been said before, these germs are living organisms. In every tiny body, substances are being produced, possibly waste products, and these are excreted through their skin. Whether by chance or design, these substances are poisons. They enter the blood stream of the animal attacked, seriously affecting the workings of the body, in some cases to such a degree that they cause death.

Incubation Period

After the invasion of the body, it is generally some time before the fight between the body and the germs really gets under way. This period between invasion and the first outward signs of infection is called the incubation period. During this stage the germs are multiplying and producing more and more poison.

Now germs have two methods of continuing the attack. Some want to invade the body themselves, producing poison as they go. Others are content to stop at the place where they broke the barrier and produce copious quantities of poison which invades the body and does the damage.

Firstly, considering those germs which invade the body themselves.

Defences

As in any battle, once the outer defences are broken, in this case the skin, the aim is to localise the attack or stop it spreading farther. It is now that we see the cardinal signs of an attack by germs. These signs are a direct result of the body's defence mechanisms. They may be listed as redness, heat, swelling, and pain. The redness is caused by an increase in blood supply to the area. The blood of an animal contains red cells which give the blood its red colour, and carry oxygen and white cells which may be called the home guard. It is these white cells which attack the invading germs.

Thus the body rushes in white cells to stem the attack. These cells leave the blood vessels and wander about in the tissues attacking and killing germs. Heat is caused also by the increase in blood supply. The swelling is caused by the increase of white cells and fluid in the tissues and the pain by the pressure of this fluid on nerves in the area.

If the white cells are completely victorious and kill all the germs, next on the scene are the stretcher bearers or phagocytes as they are technically known. These pick up all the dead germs and white cells and remove them from the battle field to be assimilated by the body. Gradually all signs of the infection will disappear and the area will return to normal.

If things are not going too well and the white cells are just managing to hold the germs, the body may decide that the easiest way out is to take some prisoners. Thus it may decide to build a wall of hard fibrous tissue around the fighters. Unfortunately the body cannot withdraw its own troops so must wall them up with the enemy. So we have the formation of an abscess. The material inside an abscess, or pus as it is called, is in fact composed of white cells and germs.

If the germs win this first battle, their easiest avenue of advance is along the blood stream, and it is along here that they run into the animal body's second line of defence.

This line is made up of the lymph glands, which are filters. It is the job of these lymph glands to trap the germs and hold them till a force of white cells can come up and kill them. As a result of the fight which goes on inside them, they may also swell up. Many people may have had experience of this when, after having had an infected finger, they get a swelling under the arm. This is caused by a lymph gland in this area trying to stop the spread of infection.

If the lymph glands are defeated, the body is really in trouble. The position now is that the germs have overrun the whole of the animal. We now say that the animal is suffering from a septicaemia. By this time two new reactions have occurred. Firstly the poisons secreted by the germs have caused a rise in temperature of the body, and secondly another line of defence has come into action.

It has been said that the poisonous chemical substances that are secreted by the germs are the things which really do the damage. Each particular type of germ produces its own special poison. As soon as the body finds out which type of poison is being produced, it begins manufacturing substances which will neutralise it. This, of course, generally takes some time and these anti-bodies as they are called, cannot be thrown into the battle until some time after the initial invasion.

Now we have a complete picture of the battle. We can see the animal's body with its temperature increased, using the anti-bodies to neutralize the poison, the white cells to kill the germs, and the lymph glands to trap and hold the germs till the white cells arrive. We can see the germs multiplying all the time and continuously producing their poison. So the battle rages, perhaps the germs getting the upper hand for a while, and then the body.

In the case of the germ which is content to stop at the place where it first broke through the skin and let its poison do all the work, the body will have a different defence strategy. In this case the production of the neutralizing chemical anti-bodies takes on prime importance. Of course some white cells will be dispatched to endeavour to kill off the germs, but the speed with which the anti-bodies can be thrown into the fight is the limiting factor.

Result

If the germs win, the animal dies and this would be the end of the story. But if the body wins, what then?

Things will gradually return to normal, but the fate of the anti-bodies is interesting. After all infections, these anti-bodies persist in the body for a variable length of time, sometimes only for a few weeks, but at times for the remainder of the life of the animal. Thus, if the same germ attacks the body again while these anti-bodies are still in existence the animal can easily cope with it, because as soon as the poison is produced it can be neutralized immediately. Thus the germ has little chance. We say then, that the animal is immune to this germ, or the disease which it produces.

Sometimes the immune animal will not allow any of the germs to which he is immune live in his body. But sometimes he might not be so fussy, and will allow them to remain and multiply. They cannot hurt him, but he is continuously passing them out. In this way he becomes the carrier animal about which we have spoken.

You, the owner of animals, can participate in a number of ways in this battle.

(*a*) *Prevention.*—Where you cannot prevent germs living and multiplying in damp shady conditions, give your animals adequate first aid treatment in times of injury. A pamphlet on first aid treatment is available from the Department of Agriculture and Stock. If you are carrying out surgical operations, be as clean as you can, and use recommended antiseptics liberally and at the correct strength. Try to give these animals a grassy paddock to run in after surgery.

Do not keep carrier animals on your place.

Try not to buy carrier animals from properties known to be infected.

Numerous vaccines are prepared for the prevention of disease. These work by causing the production of anti-bodies without producing the disease. Tetanus is one disease against which you can vaccinate.

The well-fed, well-cared-for animal is more resistant to attack by germs.

(*b*) *Help the Animal Win the Fight*—

(1) Nurse him well.

(2) Call in a veterinary surgeon.

Stock and Station

Hair Worms in Sheep—Black scours in weaner sheep usually increase in autumn and winter. Prevention of this condition, which is caused by the sheep hair worm, calls for drenching to remove the worm burden.

In Queensland, hair worms are most common on the Darling Downs and in the Goondiwindi, Roma and Central Highlands districts. The pest also extends as far west as Jericho, Barcaldine and Blackall. Moderate infestations can lower wool production by as much as 40 per cent., while heavy infestations can cause death.

To kill hair worms, drench with a bigger dose of phenothiazine than that used for nodule worms. Dose rates are: For grown sheep, 20 sheep to the pound of phenothiazine; for sheep 12 to 18 months old, 25 to the pound; and for sheep four to eight months old, 30 to the pound.

—R. B. YOUNG,
Senior Adviser, Sheep and Wool.

Tapeworms a Burden—Light infestations of sheep with tapeworm are of little or no consequence, but very heavy burdens may cause scouring, dejection and loss of condition.

Phenothiazine, the best drench for most sheep worms, is ineffective against the tapeworm. As many Downs farmers use only phenothiazine for drenching, the need to treat their young sheep for tapeworms may arise.

Bluestone-nicotine drenches are the most effective in dealing with sheep tapeworms. But in dosing young sheep, be careful to follow strictly the dose rates recommended by the manufacturer. Be careful, also, not to blame tapeworms for troubles caused by other internal parasites.

—C. SMITH,
Senior Adviser, Sheep and Wool.

Keeping Pigs Warm—A good stockman will make sure his piggery is warm, before low temperatures and biting westerlies arrive. Sheds should be free from draughts and have a warm, dry floor. A little bedding provides extra comfort.

If baby pigs are unable to keep warm in the first few weeks of life, they are likely to develop diseases or fail to grow satisfactorily. The easiest and cheapest way to keep them warm is to build a hover board in each farrowing pen.

The piglets soon learn to snuggle under the board. Their body heat warms the small volume of air in their snuggery, keeping them warm and contented in the coldest weather. They're also less likely to be trampled by the sow, as they'll spend most of their time between feeds under the hover board.

—T. ABELL,
Senior Adviser in Pig Raising.

Blackhead in Turkeys—Blackhead can cause losses of 50 per cent. or more in turkey poults. Farmers should take every precaution to keep it out of their flocks.

For the blackhead organism to complete its life cycle it requires the presence of the caecal worm. For this reason, the attack on blackhead should start before the youngsters arrive with the treatment of all the older birds for worms. An effective and cheap treatment is to supply phenothiazine in the mash for two days at ½ lb. of phenothiazine to 12 lb. of mash.

Enheptin-T should be fed to the young poults in their mash or drinking water for the first eight to 12 weeks of life. The cost is only about 1s. to 1s. 3d. a bird. Range the turkeys as much as possible and don't rear young turkeys near older birds.

—*P. D. RANBY,*
Veterinary Officer.

Danger to Sheep—Winter rain can be a big danger to off shears sheep. Last year there were some considerable losses both in road sheep and paddock sheep caught unexpectedly by winter rains and bleak conditions. Much of the loss in these cases is due to hypocalcaemia, a sudden drop in the blood calcium level when the sheep is subjected to sudden stress. Many sheep could be saved under these conditions if supplies of calcium borogluconate and a syringe to administer it were ready to hand.

Seven ounces of calcium borogluconate are dissolved in 35 fluid oz. of hot water, and when cooled to blood heat 30 to 50 ccs. are injected beneath the skin.

Any sheepman planning to shear in winter when there is a possibility that sheep may have to be turned out off shears into rainy cold conditions, should carry syringe and calcium borogluconate as an elementary precaution against possible loss from hypocalcaemia.

—*R. B. YOUNG,*
Senior Adviser, Sheep and Wool.

Timely Tips for August

AUGUST could be called "parasite" month. For worms in all animals a treatment in August is a vital one. It reduces right through the season the burden of worms that animals carry. It may seem odd to treat for worms during August, when animals won't normally be carrying a lot of worms. But when dealing with the worm, it doesn't pay to be sporting —Kick Him when He's Down!

For ticks, August is the time to start "strategic dipping". Three quick dippings at the right time will help keep ticks off your cows right through the season. Get details from your nearest veterinary surgeon and start doing it this month.

If the weather is warm, buffalo fly will soon start to be active again. Watch for cattle rubbing, and for the bare areas of skin around the eyes. Prompt treatment as soon as the fly comes about will save your animals suffering and be profitable for you. Buffalo fly irritation certainly lowers milk production, and pulls condition off beef cattle.

Watch for this small, black, biting insect, especially if you're not dipping for ticks.

Point to remember—if you treat your cattle, the buffalo fly may then attack horses, which he doesn't normally worry. Might be best to treat them at the same time.

Another point—if cattle are rubbing and you can't see signs of buffalo fly, look for lice! These small active insects can also worry cattle and they are often overlooked.

August may also be the month to get your neighbours together and arrange with your vet. for "group" vaccination with Strain 19. Strain 19 will prevent one of the three serious "breeding" diseases of cattle. It's a shame to miss the chance of eliminating a disease.

If you're preparing cattle for the "Show," feeding troubles may occur. Watch for bloat scouring, abdominal pain and nervous excitement. These are signs of troubles caused by feeding which will need veterinary attention if the value of the feed and production are not to be lost.

Plate 1: Coping With a Dozen Orphan Lambs at Once Almost Calls For the Services of a Dairy Herd.

Pets Worth £8,000 A Year

By R. B. YOUNG, Senior Adviser in Sheep and Wool.

ALMOST every sheep station in Queensland carries its quota of pet lambs. No census or survey has ever been taken at any given time of the number of these pets. But, we do know that Queensland has about 4,500 sheep flocks. The overall number of "rescued" lambs would increase in droughty seasons. This is because at such times many lambing ewes die during parturition, and others, having little milk, often desert their new born lambs.

So that, judging by the number of sheep properties where you see one, two, and sometimes a string of pet lambs, there could well be 5,000 "pets" being reared on sheep properties throughout the State in most years. If all were put together, quite an appreciable flock would result; perhaps one big enough to grow into sheep that would yield annually about 140 bales of wool.

Even at subdued wool values of approximately 47d. a lb., and £61 a bale, that wool would be worth about £8,500 a year. Many of the reared pets would be ewes and would as the years passed by help to swell the lambing percentages in the State.

So pet lambs have a considerable economic value.

Perhaps just as important, but in a more abstract way, they form a source of inspiration and companionship and have, for thousands of children, an education value in the sphere of animal husbandry. Not only do you find these popular pets around station homesteads; most bush towns and some cities have their quota. Many a Brisbane suburban backyard has its "four-legged lawn mower," whose lusty cry, contrasting strangely with city noises, can bring a touch of nostalgia to the shearer, the boundary rider, or the sheep-owner down for a visit to "the big smoke."

Recently such a suburban sheep-owner made inquiry from the Sheep and Wool Branch, asking what she could do with a three-month-old pet whose 4-feeds-a-day milk ration was costing her £50 a year!

Most farmer's drafts of fat lamb that are sent to Cannon Hill saleyards average about 50 lambs, but there are plenty of occasions when lots of one or two lambs are sold. Suburban dwellers with insufficient grazing to allow weaning and further grazing of pet lambs can best arrange disposal by contacting one of the stock agencies, who will advise when delivery at saleyards is required, and make sales for the owner.

Are Poddy Lambs Worth Saving ?

Are poddy lambs on sheep stations worth saving? With the amount of cow's milk required to rear them, and the labour and time involved, the cost aspect is quite important. Perhaps we should say—in small numbers—yes, no station should be without them; but "by the dozen"—no!

By the second week of a merino lamb's life it makes call on its mother to the extent of about 35 fluid oz. of milk daily, about 2 pints. If the lamb is an orphan you must substitute cow's milk for this. If you were to try to rear 12 lambs you would need to provide about 420 fluid oz. of cow's milk a day for quite a while. That is about 3 gal. daily. Additionally, there would be labour to milk the cow or cows, feed the lambs, and ensure that milk containers and utensils were kept scrupulously clean after each feed. Perhaps trying to rear three or four lambs would be a more sensible and economic project than trying to rear a dozen or more.

The following tables refer to milk yields of ewes:—

TABLE 1

MILK YIELDS IN A MILK YIELD TRIAL OF 17 MERINO EWES OVER THE FIRST 9 WEEKS OF LACTATION.

Weeks	1.	2.	3.	4.	5.	6.	7.	8.	9.
Yield (oz. day) ..	36	39	37	33	29	26	24	20	18

Early Care of the Orphan

Often a lamb that has never had a drink from its mother may die even if attempts are made to rear it on cow's milk. It is likely that the death of the lamb is accelerated because it has never received the valuable first-milk or colostrum.

TABLE 2

LACTATION TABLE OF MILK YIELDS FROM VARIOUS TYPES OF SHEEP SHOWING DAILY YIELDS.

Type of Sheep.	Lactation Period.	Average Daily Yield.
	Weeks.	Oz.
Border Leicester x Cheviot (high plane of nutrition and suckling twin lambs)	16	63
Australian merino (suckling twins)	10	53
New Zealand Romney	12	49
Border Leicester x Cheviot (high plane of nutrition and suckling single lambs)	16	44
South African merino cross breeds	12	36
Welsh Mountain (high nutritional plane)	10	36
Australian merino (suckling singles)	10	35
Cheviot (high plane of nutrition)	13	35
Hampshire	12	32
South African merino	12	26
Welsh Mountain (low nutritional plane)	10	25
Cheviot (low nutritional plane)	13	19

TABLE 3

SHOWING COMPARISON OF EWE'S MILK AND COW'S MILK.

——	Fat.	Sugar.	Protein.	Total Ash.
	Per cent.	Per cent.	Per cent.	Per cent.
Ewe's Milk	7·4	4·8	6·1	0·97
Cow's Milk	3·75	4·75	3·4	0·75

The colostrum contains nutritious and protective elements that fill the needs of the newborn animal for the first few days, and make its body capable of dealing later with the normal milk. In addition it is likely to contain antibodies which give the newborn lamb a passive immunity against many bacterial diseases. Scouring is a common feature in many young animals deprived of first milk. It is likely that antibodies in colostrum normally protect them against bacteria causing this, and similar diseases of the young such as arthritis.

A recipe for an artificial colostrum mixture, for use with orphan lambs that have never had a drink from their mothers is:

26 oz. of warm cow's milk in a bottle.

1 beaten egg.

1 small teaspoon cod liver oil (or castor oil).

1 dessertspoon of sugar.

The dose rate is up to 6 oz. per feed of this mixture, four times a day for the first two days. It is considered that the lamb will then thrive on cow's milk. It is likely that the artificial colostrum helps to expel the meconium, or first faeces, of the young lamb, thus preventing stagnation of bowel contents, with multiplication of toxin-causing bacteria.

Observations have shown that lambs born of poorly fed ewes have a lessened sucking vigour. Also the temperature of lambs born from underfed ewes is lower at birth than that of lambs from well-fed ewes. Practical application of these findings when related to the early care of orphan lambs calls

Plate 2: A Pet Lamb is a Source of Education for the Young.

for treatment to keep the lamb warm, and to assist its early intake of nourishment.

When the lamb is first brought in it should be kept near a kitchen fire and covered with a corn sack or old blanket.

The first feed of artificial colostrum mixture should be given immediately after bringing the lamb in. The mixture is warmed and fed to the lamb down the finger. Later, feed the lamb with an infant's bottle and rubber teat.

Following the two days' feeding with artificial colostrum, bottle-feed the lamb with warmed cow's milk. Ewe's milk is stronger than cow's milk, as Table 3 shows. It contains about twice as much fat, equal sugar, and about twice as much protein. However, in practice, cow's milk is rarely supplemented.

If you want to bring cow's milk more nearly to the nutritional standard of ewe's milk, add 1¼ oz. of whole cream dried milk powder to every pint of cow's milk.

Feeding Methods

After the first two days of artificial colostrum feeding, in which the lamb is fed 6 oz. four times a day, feed with warm fresh cow's milk to the following schedule:

Up to 4 oz. every three hours, say first feed at 6 a.m. with the last feed at 9 p.m. As soon as possible encourage the lamb to drink from a vessel by placing the finger in the mouth after putting the knuckles of the finger well down in the milk. Later, after a few lessons, withdraw the finger as the lamb becomes accustomed to draw up the milk without the aid of the finger for a guide.

At two weeks, feed three or four times a day, giving up to 8 oz. of milk per feed, or 1½ pints of milk per lamb per day.

At the same time start encouraging the lamb to eat more solid food. This can take the form of:

Bran	2 parts.
Pollard	2 parts.
Buttermilk powder	1 part.

This is given in the form of a warm porridge with milk, gradually increasing the solid, and lessening the milk until the lamb learns to eat the mixture just made into a not-too-liquid mash with milk. This will reduce the quantities of milk required.

All utensils used for feeding should be well scoured and scalded between meals, and kept in a fly-proof gauzed-in safe.

Weaning and Pasture Feeding

Within six weeks or so of birth, lambs will turn to pasture grass and herbage, and feeding of milk and mashes can be greatly decreased.

Plate 3.

More Than a Few Pet Lambs Can Become a Handful, and Then Labour-Saving Devices, Such as Multi-Feeders, Become Necessary.

Water should be provided from three weeks on, and shade and shelter given from sun, wind and weather.

Lambs reared well through the early stages often persist with their early feeding knowledge and try to share all the scraps that are going around the homestead. Garden vegetables should be securely fenced off from lambs, and they should not be allowed to rob the fowls of their due ration.

Because of good feeding and a contented outlook, they generally grow into bigger-than-average sheep, and sometimes grow prodigious fleeces.

Grown pets are useful for teaching flock sheep to eat grain or similar rations, and as decoys and leaders to take sheep into yards or shearing shed.

During the rearing period they should be protected from worm infestation and fly strike. Drenching should be carried out when the flock sheep receive their usual drenches. They should be crutched when the crutch wool appears dirty or overlong, and jetted before spring and autumn fly trouble.

It must be remembered that at times when there is a demand at the station homestead for milk for orphan lambs this often coincides with seasonal conditions when the station's milkers are hard put to supply enough milk for the humans. Nevertheless there are few stations on which it would not be economical and sound to raise a few orphan lambs at every lambing.

Tuberculosis-Free Cattle Herds.

(As at 1st July, 1959.)

Aberdeen Angus.

- G. H. & H. J. Crothers, "Moorenbah," Dirranbandi
- A. G. Elliott, "Ooraine," Dirranbandi
- W. H. C. Mayne, "Gibraltar," Texas

A.I.S.

- M. E. & E. Scott, "Wattlebrae" A.I.S. Stud, Kingaroy
- F. B. Sullivan, "Fermanagh," Pittsworth
- D. Sullivan, "Bantry" Stud, Rossvale, *via* Pittsworth
- W. Henschell, "Yarranvale," Yarranlea
- Con. O'Sullivan, "Navillus" Stud, Greenmount
- H. V. Littleton, "Wongalea" Stud, Hillview, Crow's Nest
- J. Phillips and Sons, "Sunny View," Benair, *via* Kingaroy
- Sullivan Bros., "Valera" Stud, Pittsworth
- A. C. and C. R. Marquardt, "Cedar Valley," Wondai
- A. H. Sokoll, "Sunny Crest" Stud, Wondai
- W. and A. G. Scott, "Welena" A.I.S. Stud, Blackbutt
- G. Sperling, "Kooravale" Stud, Kooralgin, *via* Cooyar
- C. J. Schloss, "Shady Glen," Rocky Creek, Yarraman
- W. H. Thompson, "Alfa Vale," Nanango
- S. R. Moore, Sunnyside, West Wooroolin
- H. M. State Farm, Numinbah
- L. R. Dennis, Diamondvale, Mundubbera
- Edwards Bros., "Spring Valley" A.I.S. Stud, Kingaroy
- D. G. Neale, "Grovely," Greenmount
- A. W. Wieland, "Milhaven" A.I.S. Stud, Milford, *via* Boonah
- W. D. Davis, "Wamba" Stud, Chinchilla
- Queensland Agricultural High School and College, Lawes
- C. K. Roche, Freestone, Warwick
- Mrs. K. Henry, Greenmount
- D. B. Green, "Deloraine" Stud, Durong, Proston
- E. Evans, Wootha, Maleny
- T. L. and L. M. J. Cox, "Seafield Farm," Wallumbilla
- J. Crookey, "Arolla" A.I.S. Stud, Fairview, Allora
- M. F. Power, "Barfield," Kapaldo
- A. H. Webster, "Millievale," Derrymore
- W. H. Sanderson, "Sunlit Farm," Mulgildie
- R. A. and N. K. Shelton, "Vuegon" A.I.S. Stud, Hivesville, *via* Murgon
- R. R. Radel & Sons, "Happy Valley," Coalstoun Lakes
- C. A. Heading, "Wilga Plains," Maleny
- G. S. and E. Mears, "Morden," M.S. 755, Toogoolawah

Ayrshire.

- L. Holmes, "Benbecula," Yarranlea
- J. N. Scott, "Auchen Eden," Camp Mountain
- E. Mathie and Son, "Ainslie" Ayrshire Stud, Maleny
- B. Goddard, Mt. Tyson, *via* Oakey
- C. E. R. Dudgeon, "Marionville" Ayrshire Stud, Landsborough
- G. F. H. Zerner, "Pineville," Pie Creek, Box 5, P.O., Gympie
- T. F. Dunn, Alanbank, Gleneagle

Friesian.

- C. H. Naumann, "Yarrabine" Stud, Yarraman
- D. J. Pender, "Camelot," Lytton road, Lindum
- S. E. G. Macdonald, "Freshfields," Marburg

Guernsey.

- C. D. Holmes, "Springview," Yarraman
- A. B. Fletcher, Cossart Vale, Boonah
- W. H. Doss, Degilbo, *via* Biggenden
- A. C. Swendson, Coolabunia, Box 26, Kingaroy
- C. Scott, "Coralgrae," Din Din Road, Nanango
- R. J. Wissemann, "Robnea," Headington Hill, Clifton
- G. L. Johnson, "Old Cannindah," Monto
- A. Ruge & Sons, Woowoonga, via Biggenden
- G. Miller, Armagh Guernsey Stud, Armagh, M.S. 428, Grantham
- N. H. Sanderson, "Glen Valley," Monto

Jersey.

- Queensland Agricultural High School and College, Lawes
- J. S. McCarthy, "Glen Erin" Jersey Stud, Greenmount
- J. F. Lau, "Rosallen" Jersey Stud, Goombungee
- G. Harley, Hopewell, M.S. 189, Kingaroy
- Toowoomba Mental Hospital, Willowburn
- Farm Home for Boys, Westbrook
- P. J. L. Bygrave, "The Craigan Farm," Aspley
- R. J. Crawford, "Inverlaw" Jersey Stud, Inverlaw, Kingaroy
- P. H. F. Gregory, "Carlton," Rosevale, *via* Rosewood
- E. A. Matthews, "Yarradale," Yarraman
- A. L. Semgreen, "Tecoma," Coolabunia
- L. E. Meier, "Ardath" Stud, Boonah
- A. M. and L. J. Noone, "Winbirra" Stud, Mt. Esk Pocket, Esk
- W. S. Conochie and Sons, "Brookland" Stud, Sherwood road, Sherwood
- Estate of J. A. Scott, "Kiaora," Manumbar road, Nanango
- F. W. Verrall, "Coleburn," Walloon
- C. Beckingham, Trouts road, Everton Park
- G. H. Ralph, "Ryecombe," Ravensbourne
- Mrs. I. L. M. Borchert, "Willowbank" Jersey Stud, Kingaroy
- Weldon Bros., "Gleneden" Jersey Stud, Upper Yarraman
- D. R. Hutton, "Bellgarth," Cunningham, *via* Warwick
- J. W. Carpenter, Flagstone Creek, Helidon
- H. G. Johnston, "Windsor" Jersey Stud, Beaudesert
- S. A. Cramb, Bridge street, Wilsonton, *via* Toowoomba
- J. A. & E. E. Smith, "Heatherlea" Jersey Stud, Chinchilla
- W. C. M. Birt, "Pine Hill" Jersey Stud, Gundiah
- T. Nock, Dallarnil
- P. Fowler & Sons, "Northlea," Coalstoun Lakes
- F. Porter, Conondale
- H.M. State Farm, Palen Creek
- B. T. Seymour, "Upwell" Jersey Stud, Mulgildie
- R. N. Burrows, Box 23, Wondai
- W. T. Tatnell, Cedar Pocket, *via* Gympie

Poll Hereford.

- W. Maller, "Boreview," Pickanjinnie
- J. H. Anderson, "Inverary," Yandilla
- D. R. and M. E. Hutton, "Bellgarth," Cunningham, *via* Warwick
- E. W. G. McCamley, Eulogie Park, Dululu
- Wilson and McDouall, Calliope Station, Calliope

Poll Shorthorn.

- W. Leonard & Sons, Welltown, Goondiwindi

The Lady Finger Banana

By K. B. McRAE,
Horticulture Branch.

Under the most favourable conditions and with efficient management, a Lady Finger banana plantation will produce profitable crops almost indefinitely.

The origin of the Lady Finger banana as a commercial variety in Queensland is rather obscure but we know that plantations were established at Pinkenba in the early days of settlement.

The coastal districts of south-eastern Queensland subsequently became, and still remain, the main areas of production. The Lady Finger banana has played an important part in the economy of districts such as Buderim, Pinkenba and Redlands where, at one time or another, it has been grown almost to the exclusion of other varieties.

Tall Growing

The Lady Finger is a tall-growing variety and the mature plant normally reaches a height of 12 to 16 ft. The pseudostem is very broad at ground level and tapers gradually towards the throat of the plant. The colouring is generally light-green with little of the dark pigmentation found in some other varieties.

The leaves average 8 ft. in length and up to 28 in. in width. They are light-green in colour, have a slight drooping habit and are widely spaced along the pseudostem. The leaf stalks are characteristically long.

Plate 1.

Lady Finger Banana Plantation in the Redlands District. The plant has a vigorous root system and throws its bunch well clear of the throat. Bunches carry up to 8 hands of fruit of excellent quality.

The bunch is slightly tapering and of moderate size with five to eight hands which are carried on a very sturdy stalk. The fruits are comparatively short and normally fill well but, when the bunch is cut at the green mature stage, may be somewhat angular.

Hardiest

The Lady Finger is by far the hardiest banana variety grown in Queensland and produces fair bunches with good quality fruit even when the plantation is under stress through lack of rain.

The root system of the plant is both deep and extensive. The strong fibrous roots have been known to exploit an area of 20 sq. ft. to a depth of 3 ft. but root development in any particular plantation is, of course, dependent on the soil type. Maximum penetration occurs in a deep, friable, sandy loam.

With such a vigorous root system, the plant can effectively use nutrients and moisture in the soil. Under favourable conditions, growth is very rapid. During times of stress, growth is certainly slower but the plant does not "go back" as quickly or to the same extent as in dwarf varieties. Conversely, the plant recovers quickly after rain.

An additional characteristic of importance in the Lady Finger banana is its ability to throw the bunch clear of the throat of the plant at all times. Choke throat—a well known disorder in dwarf varieties—is almost unknown.

The strong root system radiating from the large corm provides a very firm anchorage which enables the plant to withstand reasonably heavy winds. Bunch props are seldom needed in a Lady Finger plantation and this alone represents a worthwhile saving in labour and material. However, high winds particularly cold westerly winds, can do considerable harm to the young bunch as it moves up the pseudostem or when it is emerging from the throat of the plant. The effect of these winds—internal break-down of the fruit accompanied by finger shedding—was forcibly brought to notice following the July 1954 cyclone.

In Queensland, the Lady Finger is chiefly grown on coastal flats many of which are subject to cold temperatures and even light frosts in winter. The ability of the variety to tolerate such temperatures has made possible the establishment of the banana industry in areas which, though accessible and reasonably close to markets, are unsuited to dwarf and semi-dwarf varieties such as Cavendish and Mons Mari.

Fruit Quality

The Lady Finger banana ripens to an attractive golden yellow and the flesh possesses an agreeably sweet flavour which is characteristic of the variety and quite distinct from that of Mons Mari and Cavendish. During summer, the fruit keeps well and remains in a firm, edible condition considerably longer than do other varieties. Lady Finger is therefore invaluable for the country trade at that time of the year.

Nevertheless, the skin is somewhat tender and marks easily, particularly when the fruit is ripe.

Number of Strains

Rarely are all plants in the Lady Finger plantation uniform in bunch type. Some of the more obvious differences are obviously inherited but others are influenced by both soil and location.

In the past, selected plants have been propagated by some growers and this could be the origin of the strain which is popularly referred to as Improved Lady Finger. However, little or no systematic testing of these alleged strains has been carried out.

The so-called Improved Lady Finger has not been preserved as a separate entity and a number of strains exist in almost every plantation. For this reason no distinction is made in commercial practice between Improved Lady Finger and the standard Lady Finger banana.

Disease

The Lady Finger banana seems to be less susceptible to bunchy top than Cavendish and Mons Mari although outbreaks have been recorded from time to time in some areas.

During recent years, the acreage under Lady Finger bananas in old districts such as Redlands and Myrtletown has declined owing to the ravages of Panama disease which does not attack Cavendish and Mons Mari. Panama disease produces a form of wilt and a discolouration in the tissues of the pseudostem is characteristic.

Most of the better soils in the Redlands district are now infected with Panama disease and, on many farms, it is economically unsound to replant with Lady Finger bananas. Even after other crops have been grown for several years on the infected land, replanting is hazardous. Curiously enough, in some districts such as Buderim which are well suited to the variety, production of the Lady Finger banana is still commercially practicable although Panama disease has been present in the area for many years.

Under the most favourable conditions and with efficient management, a Lady Finger plantation will produce profitable crops almost indefinitely. Some plantations, at least 40 years old, are still in production. However, in areas where Panama disease is prevalent, the productive life of a plantation may be reduced to 3 to 5 years.

* * *

Lucerne Ensilage

Several inquiries have been received concerning the ensiling of lucerne.

Answer: Lucerne can be made into silage provided it is handled correctly. Once the lucerne has been mown, allow it to wilt for at least two hours, or longer if the weather is not hot.

This wilting is important as the moisture content is too high to make it into silage straight from the mower. If ensiled when too moist, the resultant silage will be dark, unpleasant and unpalatable.

The addition of up to 80 lb. of molasses to each ton of lucerne will help produce a good pleasant and palatable silage.

◆

Mexican Poppy

"D.J.," of the Kingaroy District, has been troubled with infestations of Mexican Poppy.

This summer growing weed is quite common in many districts. It is most frequently observed growing in sandy or silty areas along creeks and rivers. However, it is also found in cultivation and run down pastures.

Stock are not attracted to the weed as it is too unpalatable. Some suspicions are held of calf poisoning when the weed has been present in hay.

In ploughed areas, the weed is best eradicated or controlled by cultivation. Several such cultivations may be necessary during the crop's growth.

When the plants are growing vigorously, Mexican Poppies will succumb to spraying with 2,4-D at the rate of 2 lb. per acre.

Brucellosis-Tested Swine Herds.

(As at 1st July, 1959.)

Berkshire.

S. Cochrane, "Stanroy" Stud, Felton
J. L. Handley, "Meadow Vale" Stud, Lockyer
O'Brien and Hickey, "Kildurham" Stud, Jandowae East
G. C. Traves, "Wynwood" Stud, Oakey
Westbrook Farm Home for Boys, Westbrook
H.M. State Farm, "Palen" Stud, Palen Creek
A. R. Ludwig and Sons, "Beau View" Stud, Beaudesert
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
R. H. Crawley, "Rockthorpe" Stud, *via* Pittsworth
F. R. J. Cook, Middle Creek, Pomona
Mrs. I. M. James, "Kenmore" Stud, Cambooya
H. L. Stark, "Florida," Kalbar
H.M. State Farm, Numinbah
G. L. Gabanko and R. H. Atkins, "Diamond Valley" Stud, Mooloolah
L. Puschmann, "Tayfield" Stud, Taylor
C. E. Edwards, "Spring Valley" Stud, Kingaroy
V. F. Weier, "La Crescent," Clifton
N. Rosenberger, "Nevrose," Wyreema
L. P. Orange, "Hillview," Flagstone Creek
W. Young, Kybong, via Gympie
E. J. Clarke, Mt. Alford, *via* Boonah
G. McLennan, "Murcott" Stud, Willowvale
C. F. W. and B. A. Shellback, "Redvilla" Stud, Kingaroy
J. C. Lees, "Bridge View" Stud, Yandina
F. Thomas, "Rosevale" Stud, M.S. 373, Beaudesert
A. C. Fletcher, "Myola" Stud, Jimbour
Q.A.H.S. and College, Lawes
E. F. Smythe, "Grandmere" Stud, Manyung, Murgon
E. R. Kimber, Block 11, Mundubbera
A. J. Potter, "Woodlands," Inglewood
Regional Experiment Station, Hermitage
R. Astbury, "Rangvilla," Pechey
L. Pick, Mulgildie
D. G. Grayson, Killarney
A. French, "Wilson Park," Pittsworth
P. F. Pfrunder, Pozieres
A. Wolski, "Carramana," Warra.

Large White.

H. J. Franke and Sons, "Delvue" Stud, Cawdor
Garrawin Stud Farm Pty. Ltd., 657 Sandgate road, Clayfield
J. A. Heading, "Highfields," Murgon
R. Postle, "Yarralla" Stud, Pittsworth
E. J. Bell, "Dorne" Stud, Chinchilla
L. C. Lobegeiger, "Bremer Valley" Stud, Moorang, *via* Rosewood.
H. R. Gibson, "Thistleton" Stud, Maleny
H.M. State Farm, Numinbah
S. T. Fowler, "Kenstan" Stud, Pittsworth
W. Zahnow, Rosevale, *via* Rosewood
Regional Experiment Station, Biloela
G. J. Hutton, "Grajea" Stud, Cabarlah
H. L. Larsen, "Oakway," Kingaroy
A. Palmer, "Remlap," Greenmount
G. I. Skyring, "Bellwood" Stud, *via* Pomona
G. Pampling, Watch Box road, Goomeri
M. Hall, "Milena" Stud, D'Aguilar
K. B. Jones, "Cefn" Stud, Pilton road, Clifton
Barron Bros., "Chiltern Hill," Cooyar
K. F. Sturmer, French's Creek, Boonah
Q.A.H.S. and College, Lawes
R. S. Powell, "Kybong" Stud, Kybong, *via* Gympie
C. Wharton, "Central Burnett" Stud, Gayndah
S. Jensen, Rosevale, *via* Rosewood
V. V. Radel, Coalstoun Lakes
H. R. Stanton, Tansey, *via* Goomeri
L. Stewart, Mulgowie, *via* Laidley
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
O. J. Horton, "Manneum Brae" Stud, Manneum, Kingaroy
Dr. B. J. Butcher and A. J. Parnwell, 684 Logan road, Greenslopes, Brisbane
R. Kennard, Collar Stud, Warwick
A. C. H. Gibbons, Mt. Glorious
A. Kanowski, "Exton," Pechey
L. C. and E. Wieland, Lower Cressbrook
P. L. and M. T. D. Hansen, "Regal" Stud, Oaklands, Rangeville, Toowoomba
J. C. Lees, "Bridge View" Stud, Yandina.
C. Assenbruck, Mundubbera
A. J. Mack, Mundubbera
J. & S. Kahler, East Nanango
C. P. Duncan, "Hillview," Flagstone Creek

Tamworth.

D. F. L. Skerman, "Waverley" Stud, Kaimkillenbun
A. C. Fletcher, "Myola" Stud, Jimbour
Salvation Army Home for Boys, "Canaan" Stud, Riverview
Department of Agriculture and Stock, Regional Experiment Station, Kairi
T. A. Stephen, "Withcott," Helidon
W. F. Kajewski, "Glenroy" Stud, Glencoe
A. Herbst, "Hillbanside" Stud, Bahr Scrub, *via* Beenleigh
F. Thomas, "Rosevale" Stud, M.S. 373, Beaudesert
H. J. Armstrong, "Alhambra," Crownthorpe, Murgon
R. H. Coller, Tallegalla, *via* Rosewood
D. V. and P. V. Campbell, "Lawn Hill," Lamington
S. Kanowski, "Miecho" Stud, Pinelands
N. R. Potter, "Actonvale" Stud, Wellcamp
L. C. and E. Wieland, Lower Cressbrook
J. D. Booth, Swan Ck., Warwick

Wessex Saddleback.

W. S. Douglas, "Greylight" Stud, Goombungee
C. R. Smith, "Belton Park" Stud, Nara
D. T. Law, "Rossvill" Stud, Trouts road Aspley
J. B. Dunlop, "Kurrawyn" Stud, Acacia road, Kuraby
M. Nielsen, "Cressbrook" Stud, Goomburra
G. J. Cooper, "Cedar Glen" Stud, Yarraman
"Wattledale" Stud, 492 Beenleigh road, Sunnybank
Kruger and Sons, "Greyhurst," Goombungee
A. Scott, "Wanstead" Stud, Grantham
G. C. Burnett, "Rathburnie," Linville
A. J. Mack, Mundubbera
J. Ashwell, "Greenhill," Felton South

Large Black.

E. Pointon, Goomburra

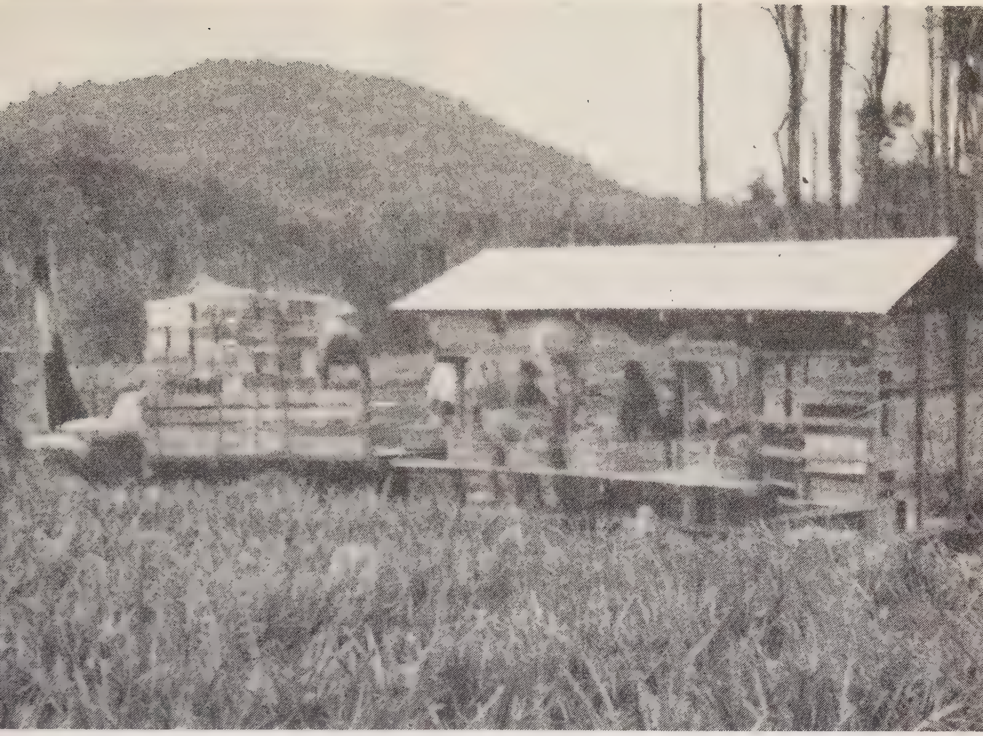

Plate 1: Mobile Packing Shed for Pineapples. The shed is mounted on an old discarded truck chassis. Traction is provided by a 5-ton truck on which the cased fruit is loaded direct and transported to rail.

Mobile Packing Shed Saves Money For Pineapple Grower

By V. C. BEAN,
Adviser in Horticulture.

A prominent pineapple farmer, Mr. A. E. Biggs of Bartle Frere, North Queensland, has cut his labour costs in half at harvesting time by partial mechanisation of harvesting and packing. He has done this by building a mobile packing shed.

Production is based on a summer crop which is all consigned to the fresh fruit market in the south. It is usually unprofitable to grow pineapples in North Queensland as a winter crop, for, at this time, fresh market prices are low. Southern cannery prices are unprofitable at any season owing to high freight costs.

Plantation Layout

To ensure efficient use of the mobile packing shed, the plantation was established on flat land. Normal double-row planting was adopted but the rows were cut at every 2 chains by roadways across the plantation.

These crossroads were all connected by a road round the plantation which gives easy access to every block.

The roads are wide enough for the pickers to move freely between the sides of the mobile shed and the growing plants.

Shed Specifications

The packing shed is built on the chassis of a discarded 2 ton truck purchased at a reasonable price complete with four wheels and tyres.

The shed is of wood and iron construction, 22 ft. long, 9 ft. wide, with sides 7½ ft. high. The floor is of hardwood timber and the roof is galvanised corrugated iron. The sides, back and front are left open for coolness.

Each of the uprights supporting the roof of the shed is braced with 2 in. x ½ in. right-angle, iron braces to ensure a rigid framework.

The shed includes four packing bays —two on each side of a central passage way in which the packers can operate freely. In each bay, a framework is constructed to hold three cases in the form of a square, open at one side. Each packer can handle three cases at a time and can pack different grades of fruit.

The rear portion of the shed holds about 70 empty cases, which have been branded beforehand by the farmer, with all necessary brands other than the count.

Above and within easy reach of each packer, shelves hold bales of woodwool and lids for the cases. On the upright at the back of each packing bay are containers for nails and holders for hammers and marking crayons.

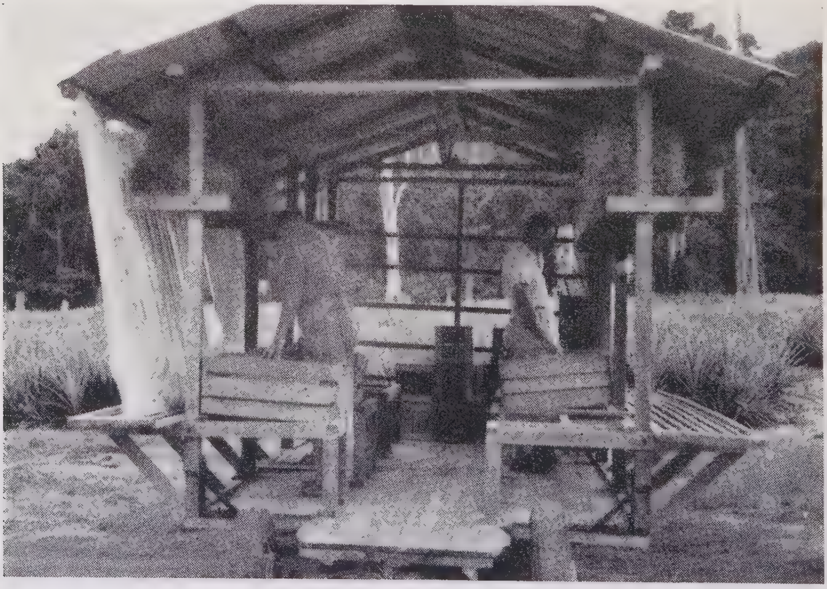

Plate 2.

Structural Features of the Mobile Packing Shed. There are four bays, two on each side of the central passage. Pickers place baskets of fruit on the slotted shelves in front of the packers.

On the outside of the shed and running lengthwise along each side is a slotted shelf at the level of the packing bays. These shelves take six baskets of pineapples each of which holds the equivalent of one case of fruit. Three cases of fruit are therefore readily accessible to the packer in each bay.

The cost of the chassis and the completed shed was £150.

Operation of Shed

The motive power for the shed is a 5-ton truck. This, coupled to the front of the shed, hauls it along the headlands and roadways in the plantation.

A picker works ahead of the shed, cutting and trimming the ripe fruit, and laying them on top of the plants. He works only to the middle of each row; a series of markers divide the rows into two sections each of which is 1 chain.

Another man works along the rows opposite the mobile shed and collects the fruit into a basket. This basket is supported by a strap over the shoulder that clips on each end. He walks out to the centre line of the block and picks up the fruit on his return trip to the shed. The full basket is placed on the packer's shelf and an empty one is taken for the next trip.

The shed is moved forward about six rows at a time and is always near the ends of the rows being harvested.

When all fruit has been harvested from both sides of one land, the shed is moved to the next headland or roadway and the same procedure is adopted. The maximum distance the carrier has to operate is 1 chain.

The fruit is packed direct from the baskets, the packed cases are lidded where they stand and then loaded on to the truck. The fruit is only handled three times from picking to the completed packed case.

The 5-ton truck has a capacity of 140 cases and, when fully loaded, is uncoupled and transports the fruit to the railhead. The shed is moved to another portion of the plantation before the truck is uncoupled so that picking and packing can continue when the truck is away.

Plate 3.

Packers Operating in the Mobile Packing Shed. Packers have ample room and ready access to fruit, woodwool and case lids.

Economic Importance

The saving in labour costs is not the only advantage of the mobile shed. The farmer also has time available for other farm operations that tend to be neglected during the rush period normally associated with conventional methods of harvesting.

The mobile packing shed now in use has demonstrated its value. It was, however, essentially a pilot model and it is now planned to erect an improved version of the shed, with several modifications which should lead to even greater efficiency.

Growers who have seen the shed in operation are impressed and there can be little doubt that others will be built for use in the larger plantations situated on more or less flat land.

* * *

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Orchard and Garden

Don't Over-Water Papaws Now—Over-watering in the winter can cause heavy tree losses in papaw plantations. Tree growth is rather slow during the cold months, and when the soil is excessively wet at this time, root rots and other diseases can develop.

Most of the papaws grown in southern Queensland are irrigated. Usually the greatest call for irrigation is in August and September. Then, temperatures are rising and good growth responses can be expected.

But during the cooler months of May, June and July, growers should be careful not to over-water. Young trees, it should be remembered, are particularly susceptible to injury from wet feet. Drier weather can be expected during the next few months and irrigation will probably be needed. At this time, light, infrequent waterings are preferable to heavy, frequent applications.

—*J. B. DAVEY,*
Experimentalist.

Protect Winter Beans—Winter bean crops in southern Queensland are usually very profitable, but to get the highest yields, some protection from the cold is essential.

Cold westerly winds or near-frost temperatures cause poor setting and badly formed pods. These troubles can be greatly reduced by planting winter beans on sloping land, well protected from westerly winds.

If you have no warm, high, sheltered land for your winter beans, cow cane or a similar perennial crop planted in strategic positions around the bean plot will be helpful. These crops should be planted in the previous spring and at right angles to the more destructive winds. Windbreaks should be angled across the slope. In this way, they will not only give protection against the westerlies but will also permit the downward flow of cold air on still nights when frosts are likely.

—*L. G. TRIM,*
Adviser in Horticulture.

Right Soil for Avocadoes—Think of land for an avocado orchard in terms of protection from strong winds, ample depth of soil and efficient drainage and you can't go far wrong. Taking a risk on any of these requirements is a horticultural gamble that seldom pays off.

Avocadoes are sensitive to cold at and shortly after flowering and to lack of soil moisture after the crop has set. A warm, sheltered site for the orchard is essential.

The avocado has the deepest root system of all the Queensland fruits. For this reason, it's very susceptible to waterlogging. Three days in a saturated soil are sufficient to damage the roots permanently. Poor soil drainage is one of the greatest hazards in avocado growing. Test borings with a soil auger on the proposed orchard site will give a good picture of the soil type and help you make the right decision.

—*W. V. MUNGOMERY,*
Horticulturist.

Buy High-Budded Citrus—High-budded citrus trees, with the union of the stock and scion at least 4 inches above the ground, are recommended for Queensland orchards.

The old practice of budding trees at ground level originated in the cool climates. There the winters are severe and the nurserymen are able to mound the soil above the bud union as a protection against frost.

But in Queensland's warm climate, the practice has nothing to commend it. The bud union is the weak point in a citrus tree when it's planted in the orchard. If this part of the trunk is covered with soil or is injured in cultivation, the chances of infection with collar rot or similar diseases are high. Use of high-budded trees removes this risk. Queensland nurserymen are now producing high-budded trees in quantity. Don't use anything else.

—*R. L. PREST,*
Senior Adviser in Horticulture.

* * *

Bananas and Sugar Cane

Bananas and Sugar Cane Growing on the Banks of the Maroochy River.

Potted Facts—VI.

COTTON—
Sausage Skins To High Fashion

By D. R. LEWIS, Marketing Branch.

THE word "cotton" is derived from the Arabic word "qutun" or "kutun." This locates the plant early in that section of the Old World. Cotton was in India before Alexander, and samples found in tombs there date it back to 3,000 B.C. It was certainly grown and spun by the ancient Egyptians and Chinese wise men wrote about it.

Cotton has been found in the prehistoric "pueblo" ruins of Arizona, and the oldest cotton fabrics now existent are the grave cloths of pre-Inca Peru. Cotton was mentioned in Hindu hymns 15 centuries before Christ, and it was the subject of legend and myth in the Middle Ages.

Improved Varieties

The fibre cotton in its present physical structure is the result of civilisation and seed selection. The plant has adapted itself to its various homes and it is now cultivated in more than 60 countries. For instance, in the tropics there are perennial types, some species attaining a height of 15 to 20 ft., and being known as tree cottons.

However, it is generally treated as an annual to insure the production of cotton of the best quality and to keep insect and fungoid pests in check. In Australia and other countries where cotton is cultivated commerically, the plant is grown as an annual in the form of a shrub, with a strong main stem up to 6 ft. high, with numerous branches, some of which carry the bolls.

The United States produces far more cotton than any other country. Up to the end of the thirties, about 90 per cent. of the world's commercial cotton production came from six countries—United States, India, Russia, China, Brazil, Egypt. Since that time the increase of cotton growing in numerous widely separated countries, and its decrease in the United States, has tended to make the world output more stable. World cotton crops, however, fluctuate widely, due chiefly to changes in the yield per acre.

Average annual yields in Queensland have fluctuated from 290 lb. to 538 lb. of seed cotton per acre. The average yield in the United States has gone from 640 lb. to over 1,200 lb. of seed cotton per acre.

Ginning and Grading

Before cotton can become commercially valuable it must go through the process of ginning—the separation of the seed from the lint. Ginning is by means of roller-gins or saw-gins Most American cotton is ginned by saw-gins, whilst in Egypt roller-gins are used exclusively. This process is gentler than saw-ginning and is more satisfactory for the long-staple crop of Egypt, the lint pulling easily from the seed. The Queensland Cotton Marketing Board uses saw-gins only,

Plate 1.

A High-Yielding Cotton Crop Being Harvested Mechanically.

of which it has 10 stands at Whinstanes and 10 at Rockhampton. Each stand has 80 saws.

The classification of cotton is a very important operation in cotton marketing. Difference in staple length, amount of foreign matter, colour and other physical properties greatly affect its spinning quality. The poorest quality of cotton of any given variety may be worth less than half as much as the best quality of that variety. Consequently every bale of cotton has to be put into its own quality category.

In the cotton trade, "grade" means a given classification of cotton, from the standpoint of foreign matter and colour; it does not cover length of staple or other characteristics. In America, for example, there are nine grades of classification for white cotton, and almost as many for non-white cotton such as yellow-stained or grey. Here in Queensland we work on eight grades. As an illustration, cotton graded SM would be Strict Middling White. Similarly, SMLS is Strict Middling Light Spotted, and SGM refers to Strict Good Middling White.

Growers will realise, therefore, how important it is to produce clean cotton, free from foreign matter, if they are to expect a good grade for their cotton, and consequently a better price.

Staple is a measurement of the quality of fibre in wool or flax or cotton. It indicates the length, strength, fineness or coarseness of the spinning quality of the fibres. Raw cotton fibres vary in length according to variety, from $\frac{3}{8}$ in. to about $1\frac{3}{4}$ in. Staple is classed to 1/32 in. for marketing. There is little demand for the very short staple lengths. In Australia, spinners normally require a staple length from $\frac{15}{16}$ to $1\frac{1}{8}$ in.

Cottonseed

The production of cottonseed is determined by the prevailing demand for cotton, although in several countries, notably the United States, the seed is an important source of income to growers. In Queensland, too, the seed increases the returns to the grower.

The commercial utilization of the seed depends greatly on the availability of suitable processing plants. In India, for example, due to the shortage of suitable plant, the bulk of the cottonseed is burnt as fuel or used as fodder. Cottonseed, as harvested, contains about 15 to 25 per cent. of oil, according to variety.

In weight, cottonseed averages about 3,500 to the pound, and for each pound of fibre, cotton plants produce about two pounds of seed. The commercial importance of the seed lies in four principal products which can be obtained through processing—oil, cake or meal, linters and hulls. Processing consists of (1) cleaning, (2) removal of linters—the fine hairs on the seed, (3) de-hulling, (4) cooking of kernels to facilitate oil recovery, and (5) extraction of the oil.

The delinting machine is very similar to the cotton gin, but with much finer teeth in the saw.

Oil is the most valuable product obtained from the cottonseed. Crude oil is dark red in colour and contains impurities, and is refined by bleaching and deodorising. The chief use of the refined oil is for edible purposes, mainly in the manufacture of margarine and shortening. The acid residues remaining after refining are used in soap manufacture and for other industrial purposes.

The cake and meal produced are high protein, easily digested cattle feed. The hulls also are used as a livestock feed. Cotton linters are used for many purposes, for example, in mattresses and in coarse cotton yarns. After treatment, linters are used in plastic manufacture, in rayon and other high quality cellulose products, and in the manufacture of sausage casings.

The following table indicates some of the many uses to which the cotton plant is put:—

TABLE 1.

Raw Cotton.

Wearing Apparel.	Household Uses.	Industrial Uses.
Shirts, piece goods, suits, coats, shoes, women's dresses, sportswear, sewing thread, knitting yarns	Bedclothes, curtains, upholstery, fabrics, oil-cloth, table linens	Motor car tyres and upholstery, tents, bags, cheese coverings, cordage, felts, fish nets, medical and military supplies and equipment, plastics

Marketing

So much for cotton itself; what of the marketing situation in Australia?

Australian consumption of cotton is about 80,000-90,000 bales each year, of which only about 3,000 bales are home-grown. Apart from cotton goods, linters and oil, imports of raw cotton alone cost over £6m. each year.

This is a measure of our dependence on imported supplies, and of the scope for greater home production. This would make a worthwhile contribution

to improving the balance of payments situation, and would also increase the diversification of farming, thus reducing the dependence of many farmers on one type of production.

All cotton produced in Queensland is marketed by the Queensland Cotton Marketing Board, which has been in existence since 1926. The board provides ginning and storage facilities at Brisbane (Whinstanes) and at Rockhampton, and operates an oil mill at its Brisbane depot.

Cottonseed

Kernels	refined oil	shortening, margarine, salad oil, packing oil (sardines), medicinal preparations, cosmetics
	foots	washing powders, acid oil, soap, candles, waterproofing, insulating materials
	cake and meal	dairy cattle (milk production), beef cattle, sheep, pigs
Hulls	stock feed	
	fertilizer	
	fibre	
	fuel	
Linters	stuffing material	mattresses, upholstery, cushions, quilts
	surgical dressings	absorbent cotton, bandages, gauze
	lower grade yarns	wicks, twine, carpets
	cellulose	paper, cellophane, explosives, plastics (motor car parts, electrical parts, toilet ware, jewellery, safety glass, films), rayons, lacquers and enamels, sausage casings

Plate 2.

Ginning Seed Cotton at Whinstanes in 1958.

In addition, the board has for some years operated a fleet of mechanical harvesters and has proved to growers that these machines can be operated efficiently under Queensland conditions. This season the board, in conjunction with the Department of Agriculture and Stock and the Irrigation and Water Supply Commission, is carrying out field trials and experimental work on the St. George irrigation area.

Cotton growers have had the advantage of guaranteed returns for many years, by way of bounty from the Commonwealth Government. The first Cotton Bounty Act was passed in 1926. The present bounty guarantees 14d. per lb. seed cotton for grades above strict good ordinary, and will continue in force for the next five years. This is some encouragement to growers to invest in necessary labour-saving equipment, such as cotton pickers and high-clearance tractors.

The following table shows production and returns to growers since 1934:—

TABLE 2.

COTTON: Production and Net Returns to Growers, 1949–50 to 1956–57, with 5-Year Averages for 1934–35 to 1938–39, 1939–40 to 1943–44, and 1944–45 to 1948–49.

Season.	Ginned Equivalent in Bales.*	Commonwealth Bounty Paid per lb. Raw Cotton Lint.	Returns to Growers (including Bounty).	
			Per lb. Raw Cotton Lint.	Per lb. Seed Cotton.
		d.	d.	d.
Average 1934–35 to 1938–39	11,728	3·89	11·61	4·03
Average 1939–40 to 1943–44	8,528	2·39	13·80	4·82
Average 1944–45 to 1948–49	1,434	1·81	16·69	5·86
1949–50	806	Nil	31·46	11·43
1950–51	1,124	Nil	58·16	21·39
1951–52	1,483	Nil	32·43	11·35
1952–53	4,229	2·05	37·81	14·42
1953–54	2,819	4·44	38·57	14·28
1954–55	4,386	7·46	36·83	14·10
1955–56	3,046	19·75	38·60	14·32
1956–57	2,845	13·66	40·32	15·83

* Bales of approximately 500 lb.

(Source: The Cotton Marketing Board).

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Irrigation Spray Efficiency

Uneven distribution of water is a common fault in spray irrigation plants. It can be caused by inefficiency in the plant itself, by having the spray lines too far apart or by operating the sprays at the wrong pressure.

This is a simple method of testing the efficiency of a spray irrigation plant: Place a number of small tins with sharp edges in chequer-board fashion and 12 ft. apart between two sprinkler lines.

Operate the spray system for an hour, then measure the water in each tin. Calculate the amount of water collected in all the tins, then work out the average amount collected in the 25 per cent. of tins with the lowest registration. The distribution efficiency is the ratio between the low 25 per cent. average and the overall average.

If this check shows that your spray efficiency is low consult your local Adviser in Agriculture.

—A. NAGLE,
Irrigationist.

Good Leaders Learn By Experience

By J. PARK,
State Organiser, Junior Farmers.

In the previous issue, consideration was given to a list of characteristics which it was suggested contained some of the qualities of maturity. Before we attempt to relate these characteristics to the needs and interests of young people, let us summarise them briefly:

To have an open, inquiring mind; to be ready to accept responsibility for one's actions; to acknowledge the debt we all owe to the community in which we live; to be able to deal with people and with situations; to be articulate; to be steady and purposeful; to have a satisfactory attitude to the opposite sex; to have outgrown the self-interest of the young.

Would you agree that these characteristics are those of a mature person? Further, would you agree that it should be an objective of the Junior Farmers Organisation to assist its members to become mature persons?

Assuming that we are in some measure of agreement on these matters we can proceed to take a look at the needs and interests of youth.

No one will deny that youth is a time of experiment and adventure. The transition from the world of childhood to that of the adult calls for knowledge and experience. Knowledge the youth will certainly attain; it is our responsibility as parents, advisers and leaders to ensure that worthwhile knowledge is provided, and that it is put to good use.

There is no substitute for experience, and sooner or later the youth must walk alone. His early footsteps will be uncertain, and his progress often painfully slow. All that we can do is try to ensure that his environment is healthy, stable and conducive of constructive efforts, and that when his progress falters we are there to guide and advise.

Learn to Act Alone

Once our members have begun to act alone in this adult world, we must encourage and train them to accept responsibility for their actions. It is futile to expect young people to accept responsibility without some training, or before they have had an opportunity to experience the consequences of their actions.

Where untrained youth acts without guidance, and when youth is permitted to escape the consequences of its actions, the outcomes are usually antisocial, to say the least.

Learning to live with people in a manner which shows consideration for the rights and privileges of the individual, forces us to accept sooner or later (sooner if we receive enlightened training) that we owe most of what we are, or what we are likely to become, to the community to which we belong. Acceptance of this fact is usually accompanied by some desire to serve that community, especially if what we are satisfies us.

The boundaries of our community will depend upon the breadth of our experience. As our horizons widen so our own community becomes larger, until the fully mature adult ceases to think only in terms of his own parish, and projects his thoughts on a State, national or international level.

Must Get Along with Others

As the boundaries of our community are widened so is our ability to deal with people and situations put increasingly to the test. Our member must first learn to "get along" with his fellow club members, and to adjust himself to the various situations in which his active participation in club affairs will place him. As he gains in club experience his value as a member will be recognised, and his responsibilities will be increased.

These increased responsibilities will lead him outside his own club environment, and require him to meet, and win the respect and liking of members from other clubs.

So the circles widen until the limits of his own particular abilities have been reached.

Must Speak Clearly

Our member's ability to make his own wishes and desires felt, and to bring his thoughts to bear upon the problems associated with running his club or his community will depend in a great measure upon his ability to express himself clearly and concisely. To be inarticulate is to have one's usefulness in contemporary society reduced almost to the level of impotency. The Press, Radio and Television have shattered most of the barriers to communication, and to be an alive and useful member of society requires our member to be able not only to express himself adequately, but to be able to understand what the other man is trying to say. Whilst the media of communication have improved to a degree beyond man's imagining a generation ago, man's own ability to communicate has not made commensurate progress. This is a problem which confronts all those concerned with education, and it is one which must be overcome at all costs.

Self-Discipline

In this age of speed and change, the ability to concentrate, and to pursue a chosen course steadfastly will be hard won. Our member will be subject to stimuli from many sources, and only by the acquisition of self-discipline will he be able to receive them with equanimity. Self-discipline can only be learned. It is society's responsibility to ensure that its members are given the opportunity to learn it.

This learning process should, of course, proceed in a controlled environment, preferably one in which boys and girls will be able to grow up together. Only in so doing will each be able to make a correct evaluation of the other's rights and privileges. Where mutual respect among members of society prevails, the self-interest of the individual will be reduced to a desirable minimum. It is wrong to hope that self-interest will be eliminated. Without it, initiative and worthwhile ambition would have no existence.

Hints For Club Members

The School Project Clubs and the Scholarship Grade pupils are the natural reservoir from which clubs should draw their members. We suggest that each club should seek permission from head teachers to speak to those pupils who will be leaving school this year. Tell them about the organisation, and try to make them feel that you are anxious to have them in your club.

Debating plays an important part in club activities. Its real value lies in the stimulus it provides for members to think about current problems, and the encouragement it gives to efforts in oral expression. However, the newer members must be given time to find their feet before they are asked to debate. In this activity, hasten slowly.

"The National Parks of Queensland"

A booklet issued by the National Parks Association of Queensland describes many of our State's beauty spots that are protected and preserved for the nation. It is well illustrated with more than two dozen excellent photographs. These give a fair idea of the glories of nature that are in store for those who visit any of our national parks, and furnish visible proof that holidaying and bush walking in any of these areas would be a most rewarding pastime. As the booklet states: "Natural Parks here are regarded as national domains belonging to all the people. They are not the special property of any particular section or locality, but are available for use and enjoyment by all." The price of the booklet is 3s. 6d.

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Spraying Noogoora Burr

VH-BJK
VH-BJK

Preparing for Aerial Spraying of Noogoora Burr on Verastan Station, Muttaburra.

The Farm Family

Thought For Food

Why Do We Need Food?

Because tissues used up by the body in work, play and exercise must be replaced. Only by eating food can we replace these tissues—and the better the quality of the food, the more efficient the replacement and the greater the health and strength of the body.

- We need foods rich in the "builder" elements for growth and repair.
- We need foods that contain "protective" elements to arm us against infection.
- We need the "fuel" foods to give us warmth and strength.

Fortunately we do not need to worry about balancing these food needs in our diet. Doctors and dietitians have worked out our needs and given us this list of seven food groups, which contain all we must have for health.

How Much Do We Need?

As a general rule, people who work at a desk need less than others in more active occupations. For instance, a coal miner would need to eat twice as much as an office worker.

Some people need more food than others, simply because they use energy at a faster rate. Aim to serve three square meals each day, and leave it to natural appetite and hunger to determine the amount eaten. Preserve health and normal weight by eating regular and sensible meals—and don't eat in-between-times just to satisfy a social custom.

How Often Should We Eat?

Convention seems to have established a routine for eating, and the routine is logical and convenient. First thing in the morning—in the middle of the day—and the end of the day are the right times for taking the nourishment to sustain us for the day's work and play. Children's after-school and between-meal snacks should be restricted to milk and fruit.

Cooking to Retain Nutriment

If you're thoughtful and thrifty in the selection of foodstuffs—carry on the good work in the kitchen. Careless cooking robs food of flavour, destroys nutriment and wastes the pennies you've saved on shopping.

Here are some cooking and food storage pointers aimed at health and economy:—

(1) Prepare vegetables just before cooking; use BOILING water and cook as quickly as possible, in a tightly covered pan.

(2) Use as little water as possible —and don't throw it away. It's too valuable. Serve it, rich in vitamins and minerals, as a simple soup base.

(3) Don't overcook. Cook food long enough to make it tender —but no longer.

(4) Don't keep food hot. Serve it as soon as possible after cooking.

(5) When oven-cooking meats and meat dishes—follow an authoritative recipe book.

(6) Store eggs in a cool place—and don't wash before storing.

(7) Keep vegetables in a cool place. Vegetables to be eaten raw will remain crisp if they are washed and drained, wrapped in damp cloth and wax paper, and stored in ice chest or refrigerator.

(8) Dry foods, such as cereals, flour, and dried vegetables should be stored in tight containers to be safe from moisture, dust and vermin.

Food Preparation and Hygiene

Most infection enters the body through the mouth! Knowing that, we must be scrupulously careful with hygiene in meal preparation. A thorough hand-washing with nail-brush and soap before handling food is a vital safeguard for family health.

Simple Facts About Vitamins

An elderly lady was once heard to remark: "I think we were a lot better off before they invented vitamins!"

The point is that no-one invented Vitamins.

We simply discovered that certain elements now called Vitamins A, B, C, and so on, were contained in the foods that have been eaten and enjoyed for centuries. We also discovered that various vitamins have specific jobs to do in the maintenance and safeguarding of health.

The discovery of vitamins does not make nutrition any more complex. No scientific knowledge is needed to plan for the inclusion of vitamins in our meals. Vitamins occur naturally in the foods from which we chose our "balanced" diet. If we eat a little every day from each of the seven food groups listed in this pamphlet we are sure to include all the vitamins and elements essential to good health.

Enjoying Our Meals

Food is—and should be—one of our pleasures. Pleasant meal tables make for serene digestions and happier people. Tension and hurry are enemies of your digestive system, and thus your health. Plant to have regular, well-organised meals, and be relaxed at the meal table. Be efficient and far-sighted beforehand so that you can give your attention to your own and your family's pleasure round the meal table.

Here are the DAILY Food Needs for Each Person.

Milk—Not less than ½ pint of milk for adults. Not less than 1 to 1½ pints for children.

Potatoes—One serving. OTHER VEGETABLES: A leafy green or yellow vegetable. A third vegetable adds variety.

Fruits—One serving of citrus or tropical fruits, or tomato.

Meat, Fish, Cheese, or Poultry—At least one serving.

Eggs—One; if available.

Cereals and Breads—One or both at every meal.

Butter and Other Fats—A little according to personal requirements.

Sugar, honey, jam, and syrup contribute fuel only, and should be used as a supplement and not as a substitute for the above foods.

When each day's menus include food from all seven groups we're sure of a "balanced" diet, and also take all the roughage needed for regular elimination.—Queensland Health Education Council.

Kaban Potato Grower Gets 23 Tons To The Acre

By T. K. KELLY, Senior Adviser in Agriculture
and J. C. KERR, Field Assistant.

Mr. Bill Jonsson, a potato grower of Kaban, North Queensland, produced 23 tons of potatoes to the acre from an 8-acre paddock. This is how he did it:

(1) Land preparation over two years, involving green manure crops.

(2) Heavy application of fertilizer; one ton to the acre at planting; one bag to the acre during the growing period.

(3) Using large seed, which required 1½ tons of seed to the acre.

(4) Efficient watering and pest control.

Land Preparation

The land preparation phase occupied two years. In December, 1956, a crop of Poona cowpeas was planted and allowed to mature and die. The area was ploughed in October, 1957 and planted to maize in November of that year.

Plate 1
General View of Potato Crop. Variety is Sequoia.

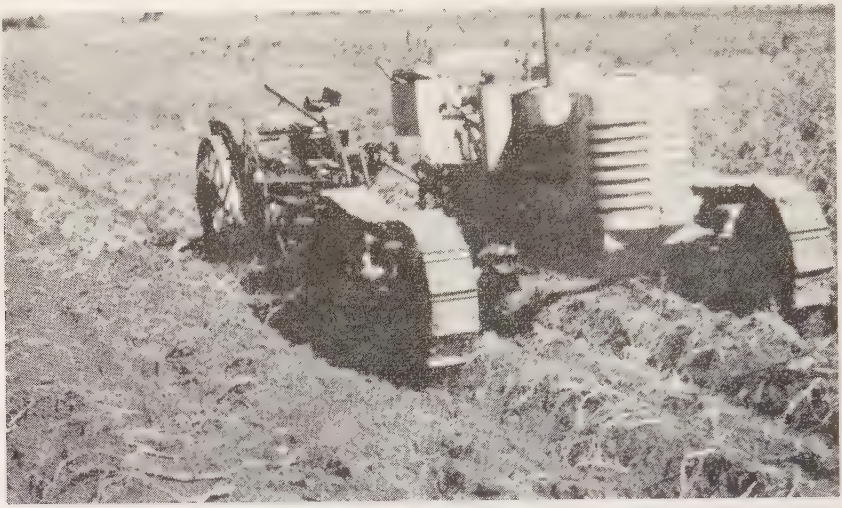

Plate 2

Digging the Potato Crop.

This produced a green manure crop of approximately 15 tons to the acre which was turned under in February, 1958. An oat crop followed and was ploughed in as a green manure at the end of May. The potatoes were planted on July 27, 1958.

Fertilizer

As a result of trying various mixtures Mr. Jonsson has found a 5-14-5 fertilizer the most suitable for his area. He used 1 ton to the acre before planting. Of this half was broadcasted and the remainder applied in the drill the day before planting.

In the growing period a bag of sulphate of ammonia to the acre was applied through the spray lines. Half a bag was used at flowering and the balance six weeks before harvesting.

It is of interest to note that a correlation exists between fertilizer rates and yields in recent years on this farm. The previous year, Mr. Jonsson obtained 15 tons to the acre when using 15 cwt of fertilizer. Before this his yields were in the vicinity of 10 tons, using 10 cwt. of fertilizer to the acre.

Seed and Plant Spacing

Certified Sequoia seed was used for this area. This variety has given the most consistent yields on the Tableland. A ton and a half of seed to the acre was planted with a spacing of 10–13 in. in the rows according to size of the seed. The seed was a "run of the crop" and varied in size.

The greater part of the area was sown with whole seed of about 6 oz. Where seed exceeded 8 oz. it was cut and planted in a separate section. While the latter area gave a good yield, it was evident that whole seed gave a better result.

Row spacing was 34 in. This width is considered by Mr. Jonsson to be the minimum width to allow enough soil for efficient hilling.

Watering

With the use of whole seed, the initial watering is carried out following planting. When cut seed is used, Mr. Jonsson waters prior to sowing.

The crop was watered at weekly intervals with an application of 1½ in. each time. It was necessary to omit only one watering because of rain. Consquently the water requirements of this crop were supplied almost entirely by irrigation. The medium pressure system in use gave an application of ½ in. an hour with nozzles spaced every 36 ft.

Pest and Disease Control

Spraying was carried out regularly during the growing period from "hilling up to drying off." Five treatments were given in the growing period and three as the bushes died. The late sprayings were aimed at preventing a build up of Tuber Moth before harvesting. Both DDT and Endrin were used for pest control and Zebtox was added on two occasions to prevent blight.

Inter-row Cultivation

The area was harrowed about three days before the plants emerged. The next cultivation was made as soon as the rows could be distinguished. Three more were carried out, of which the last was a hilling.

Plate 3
Picking Up and Bagging Stage.

Harvesting and Storage

An elevator-type machine was used for digging; manual labour was responsible for picking up and bagging.

To meet market conditions in the north, the potatoes were successfully stored for about two months in a barn with a wooden floor 3 ft. from the ground. Walls were sprayed with Endrin and the potatoes were treated with a 2 per cent. DDT dust. Endrin was sprayed around and under the barn every week.

At the time of sale it was found that there was a shrinkage in weight of approximately 10 per cent. This gave a net yield, after shrinkage, of 20 tons of marketable potatoes to the acre.

Machinery and Equipment

Mr. Jonsson has efficient equipment for potato growing. A 40 h.p. tractor is used for ploughing and discing operations. For inter-row cultivation, he has a 25 h.p. crawler tractor with 8 inch tracks. The boom spray is carried by a 20 h.p. tractor with 4 inch steel wheels. This spray equipment is worked at 150 lb. pressure, using 100 gal. to the acre.

Costs

Allowing 12½ per cent. for depreciation of equipment, Mr. Jonsson found that the cost of producing this crop was £475 an acre.

With an average selling price of £40 a ton, his net return was £325 an acre.

Pasture and Crop

Money in Sweet Potatoes. There is more money in sweet potatoes than most people realize. They are grown as a minor crop in almost every coastal district in Queensland from the southern border to Cooktown.

Sweet potatoes are becoming very popular for human consumption, provided good quality, stringless varieties are grown, such as the variety Abundance.

They are also used as a bulk feed for cattle and pigs. When used in that way there is no risk of poisoning whether the vines or tubers are fed or grazed. The recommended varieties for growing for stock are White Maltese or Porto Rico. A fair average yield of sweet potatoes would be 6 to 8 tons to the acre, but heavy yields up to 15 tons to the acre are not uncommon.

Irrigated Pastures. The careful management of newly sown irrigated pastures is very important as the stand and composition of the sward are largely influenced by the care and attention given to the pastures in the critical establishment stage.

Young pastures need an adequate supply of soil moisture but frequent, light irrigations should be avoided. Continued wetting of the surface soil encourages development of the shallower-rooted clovers and annual components, and the competition from these may cause a reduction in the stand of the slower-growing perennial types.

Don't graze the young pastures too early or too heavily. Grazing should be delayed until the plants have made good growth and strong rooting systems. If weeds are troublesome, give a high mowing rather than a grazing and leave the clippings on the soil to provide a protective mulch.

Use light pasture harrows to spread manure. Heavy harrows will tear out the young plants.—*A. NAGLE, Irrigationist.*

Healthy Tobacco Seedlings. Main task of Queensland tobacco growers at present is to raise healthy, vigorous seedlings for transplanting early in summer. Only good quality seedlings will grow into the high-yielding plants that repay the farmer for his work.

This job calls first of all for the use of disease-free seed with good germination. The seed must be sown in properly prepared seedbeds and protected from pests and diseases.

Pure seed, specially treated to free it from diseases and tested for germination, is available from the Department. Main varieties are: Hicks, Hicks (Pioneer selection), Virginia Gold, 402, Gold Dollar and Virginia Bright Leaf. Of these, Hicks is by far the most popular. In ordering your seed, remember a quarter of a teaspoon will plant 50 sq. ft. of seedbed. You can grow sufficient seedlings to plant an acre on 100 sq. ft.—*A. WINTERTON, Agronomist.*

Dual Purpose Grazing Crops Help Downs Dairymen

By J. HART,
Senior Adviser in Agriculture.

On the Darling Downs, summer and winter crops that yield both grain and fodder can play a part in the dairy farmer's programme.

On the mixed dairy farm such as is found on the Darling Downs, grazing crops generally provide the cheapest fodder. Efficient management of such crops will extend the grazing period obtained from them and in flush seasons, a surplus of feed may result. The farmer is then confronted with the pleasant problem of handling this surplus.

The dairy farmer should always plan with the view to having this grazing surplus. In so doing the aim is to select crops which, if not needed for green feed can be handled without the expense of hired machinery, and either find a place in his own fodder reserve programme, or be harvested and sold as a cash crop. On the Darling Downs, grain harvesting machinery is almost standard equipment. Therefore, in that area, dual purpose grain crops should form the basis of both winter and summer sowings.

Plate 1

Could this be yours? Try Lawrence or Hopps as a dual purpose crop.

As a word of warning though, don't stint your cows because you have the vision of a handy grain return. It is always a temptation. On present day prices, what goes through the cow is more profitable than what goes through the header. If dual purpose crops are treated with this in mind then certain varieties of wheat and oats as well as some of the millets can play a part in the dairy farmer's programme.

"Steam-up" for Dual Purpose Crops

Dairy farmers are familiar with the "steaming-up" process in relation to their cows. The same principle applies to crops. Land preparation is a form of steaming up for crop production.

If any crop is to provide both grain and grazing it must have an adequate supply of both soil moisture and nitrogen. Moisture can be assured by trapping and storing as much rain as is possible during the land preparation process. This stored moisture is needed to supplement seasonal rainfall.

Nitrogen, in a form available to plants, is released to a growing crop only if all stubble from the previous crop is decomposed before sowing. Land preparation should aim at that end. Better still, let the dual purpose crop follow a leguminous one such as lucerne. This is when dual crops are seen at their best.

If you have no legume land available, and if your cultivation is old and doubtless low in nitrogen of any form, try nitrogenous fertilizers. An application of 1 cwt. of sulphate of ammonia to the acre will often make the difference between a good and a poor dual purpose crop.

But here is another word of warning. Nitrogen alone is not enough; it can be dangerous. Moisture alone is not enough; it will produce little. But combine the two and then dual purpose crops give outstanding results.

Grazing and Grain Wheat Varieties

Lawrence and Hopps are the two dual purpose wheat varieties. Lawrence is an old variety, Hopps a recent release. Both are good.

Both varieties are at their best when used as dual purpose crops. They are not recommended for straight grain sowings. After being subjected to as many as three grazings, however, both are still capable of giving grain returns as high as 36 bushels to the acre—provided adequate moisture and nitrogen are available.

March is the suggested sowing month, although in practice Hopps at least has performed well from late January sowings.

Dual Purpose Oat Varieties

Most oat varieties grown in Queensland are of the dual purpose type. Bovah, because of its tendency to shatter, is not recommended.

Algerian and Klein, because of their slow maturing habits, are the best dual purpose varieties. Clinton, Benton and Lampton, though somewhat faster, are also worthwhile selections.

Oats afford such excellent grazing, however, that it is generally preferable to use them solely for this purpose and to treat the dual purpose wheat as the likely source of a cash crop return.

Dual Purpose Summer Crops

Dual purpose crops in the summer-growing class are very limited. The Seed Certification Scheme has halted the trade in sudan grass grain from the dairy farmer's surplus sudan crops.

The only crops worth considering are Japanese millet and white panicum. Of the two, Japanese millet is the superior dual purpose crop. Unfortunately there is a demand for only limited supplies of these seeds. If the grower is able to "catch" the market, however, these grains can be very profitable sidelines to a dairying venture.

Two Reminders

1. On the smaller farms there is more money in dairying than in grain growing.

2. There is no money in dual purpose cropping unless both moisture and nitrogen are readily available.

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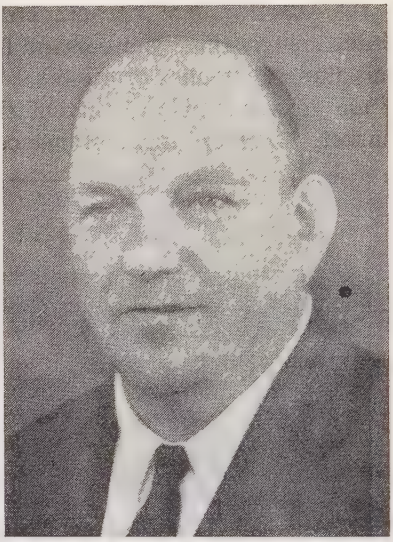
For the Fodder Bank

The Forage Harvester with Pick Up Attachment Chaffs Hay Ready for Storage or Direct Feeding to Stock.

New Events in Agriculture In North Queensland

The latest activities of his department in northern Queensland were outlined by the Minister for Agriculture and Stock (Hon. O. O. Madsen, M.L.A.) recently.



Hon. O. O. Madsen, M.L.A.

Mr. Madsen said that the Agriculture Department's new tobacco experiment station at Parada, near Mareeba, is rapidly taking shape. It is hoped that the official opening may be possible early next year. Experimental work will include varietal and seedbed trials, blue mould studies and irrigation trials. There will also be investigations to determine the best plant and row spacings.

Pasture investigation and cropping trials have also been planned. The aim of these is to determine the agronomic potential of certain soil types concerned in the development of the Tinaroo Falls Irrigation Scheme.

An Agriculture Department officer at Mareeba is engaged full-time in advisory work and handles the individual problems of the farmers.

Mr. Madsen said tobacco growing is an important industry in north Queensland. In 1958-59, the Mareeba-Dimbulah area grew 4,000 acres of tobacco and the Ayr-Ingham-Woodstock area 1,400 acres.

At the Mareeba selling centre in 1957-58, more than three million pounds of leaf were sold for a return of more than £1,750,000. The average price was 138.58d. a lb. At the Brandon centre in the same year, more than one million pounds of leaf were sold for £559,000, or 127.43d. a lb.

Studies on Blue Mould

A study of the blue mould position in north Queensland tobacco areas will be repeated this year, Mr. Madsen said. Last year, an extensive six months' survey gave valuable information, but further studies are necessary. Climatic conditions last season were not suitable for a severe blue mould outbreak, but a useful insight into the disease problem was obtained.

Research work designed to develop an efficient spray for controlling blue mould in the field is in progress.

Mr. W. Pont, an Agriculture Department pathologist, now has a formula considerably better than conventional materials. However, a spray that can be relied upon to control an epidemic of the disease such as often occurs late in the season is still a long way off.

New Tea Planting

Mr. Madsen said that a new, small experimental planting of tea is being made in north Queensland. It is being put in at East Palmerston.

For years, the Agriculture Department has grown tea experimentally on the wet lowlands at the Bureau of Tropical Agriculture, South Johnstone. From this plantation, tea equal to world standard commercial grade has been produced. Part of this plantation is being converted into a seed garden so that fair quantities of the seed will be available in the future if required.

Tea is usually grown on the wet highlands, not on coastal lowlands. It is for this reason that the new planting is being made at East Palmerston, which is 500 ft. above sea level. When mature, it can be expected to indicate what effect altitude has on the quality and yield of tea under north Queensland conditions.

The Minister pointed out that the tea plantation at South Johnstone had yielded more than 1,000 lb. of dry leaf to the acre. Tea experts considered this yield well up to world standards. Both Australian and overseas tea tasters had confirmed the good quality of Queensland leaf.

Plucking costs are the main bar to the establishment of a commercial tea growing industry in Queensland. Cost of hand-plucking leaf on the experimental area is in the region of 12s. a lb.

Harvesting with a modified Tarpen hedge trimmer has reduced this cost by about one-third, and given good quality tea. But this cost is still too high and improved methods of mechanical plucking are being sought.

Under present conditions, any establishment of commercial tea growing in Queensland will depend in the first instance on the development of efficient mechanical harvesting.

Burdekin Crops Encouraging

Proof that the soils along the Burdekin can produce high yields in a wide range of crops is piling up at the Millaroo Regional Experiment Station, the Minister said. Early investigations at Millaroo, 40 miles upstream from Ayr, were giving a favourable picture of the district's capabilities.

Full development of the Burdekin River Irrigation Scheme calls for the use of large tracts of country for the production of other crops besides tobacco. Irrigated pastures, for example, could probably make profitable use of land unsuitable for the production of other crops.

On the levee soils at Millaroo, investigations are concerned mainly with tobacco production. But it has been demonstrated that maize and cotton can also be grown profitably. Maize yields have exceeded 100 bushels an acre, and cotton yields have reached 1,400 to 1,500 lb. an acre.

An interesting point about maize and cotton is that they are grown in what would be regarded as the "off" season in other parts of the State. These are summer crops, but on the Burdekin, they are grown in the cooler months of the year—between March and September.

The levee soils have also produced a wide range of horticultural crops.

On the heavier flood plain soils, the merits of irrigated pastures are being examined. A large area of a para grass-centro mixture is now approaching the stage when grazing trials can be commenced.

It is hoped that the pasture studies will be the means of stepping up beef production on thousands of acres of Burdekin country. The possibility of dairy production, too, cannot be overlooked.

Buffel Grass for North-west

Buffel grass, said Mr. Madsen, seems certain to play a key part in increasing animal production in north-western Queensland. He said his Department had recognised the potential for improved pastures in this region and the suitability of buffel grass under the rather harsh conditions. But little was known of the best methods of establishing it and of the soils suitable for buffel grass.

For this reason, Mr. D. I. Sillar, an agrostologist, was appointed to Cloncurry two years ago especially to study these problems.

Working in close co-operation with pastoralists and pastoral companies, Mr. Sillar has laid down trials to test methods of establishing buffel grass. He is also paying particular attention to the soil types that will support buffel grass.

Mr. Madsen said Mr. Sillar was measuring the rates of spread that can be expected under various types of property management. He is also investigating a wide range of pasture species including grasses, edible shrubs and legumes. These are being tested on a variety of soil types.

Tropical Legumes Show Promise

Referring to tropical pasture legumes, Mr. Madsen said these show promise of being as valuable in north-eastern Queensland as subteranean clover is in southern Australia. They are making it possible to establish improved pastures in the wet areas of the northern coast.

These pastures will enable cattlemen to turn off prime quality beef for the chiller trade. Pastures have been guinea grass, molasses grass or para grass in combination with centro or some other tropical legume. At the Bureau of Tropical Agriculture, this feed has carried a beast to 1½ acres and given year-round weight gains of 1⅓ to 1½ lb. a beast a day.

Mr. Madsen said the Agriculture Department had pioneered this development of improved pastures on the wet tropical coast. It had tested legumes and pasture mixtures that would thrive on a wide range of soils, including some of rather low fertility.

The legume centro, first tested at the Bureau of Tropical Agriculture, South Johnstone, is now coming into wide commercial use in North Queensland. More than 1,000 acres have already been sown to this pasture plant and plans are in hand for the production of high quality Queensland grown seed.

Stylo is proving of value in spreading into ridgy country, now dominated by blady grass. The "newer" legume, *Glycine javanica,* has been tested at the Kairi Regional Experiment Station and on East Barron farms. It is showing considerable promise as a grazing legume. Its ability to spread and grow vigorously on old maize cultivations has been demonstrated on Mr. J. Killoran's farm at East Barron.

New Land Usage

Greater farm productivity is emerging from a new system of land usage being pioneered at the Kairi Regional Experiment Station. It shows promise of giving a better all-round return for farmers on the fertile Atherton Tableland.

For many years it had been the general practice on the Tableland to grow maize continuously. This is an exploitive system of land use. That it has been possible to continue it for so long is proof of the high fertility of Tableland soils.

In recent years, however, the toll of soil erosion, which has been occuring in varying degrees of severity for a lengthy period, has been reducing yields. Farmers are now aware of this threat to their livelihood.

The most effective method of overcoming soil erosion and restoring yields is to use a rotational cropping system. The best restorative crop is pasture.

At the Kairi Regional Experiment Station, dairying and maize growing are being combined in an eight-year rotation programme. Four years of pasture are followed by four years of other crops before the land is again returned to pasture.

In the first eight years, soil erosion has been checked. Maize yields are maintained at 60 to 70 bushels an acre, compared with the district average of 20 to 30 bushels. Milk production, too, is well above the district average. In February, the average daily yield per cow under this system on the Station was two and a half gallons of milk.

Side-by-side with this work, Agriculture Department officers at the Station are examining new pasture species. When suitable species are identified and tested, they could help greatly to improve the quality of Tableland pastures. Already some promising results are being obtained.

Culinary Dry Beans

Experimental work has begun at the Ayr Regional Experiment Station to determine the potentialities of the district for the production of culinary dry beans. Large quantities of these beans are imported from overseas.

The Burdekin delta has won its spurs as No. 1 production area for the production of French bean seed and it is confidently expected that the production of culinary dry beans should be commercially practicable, the Minister said.

At the present time, Australian imports of culinary dry beans are worth more than £300,000 per annum, and the demand is increasing from year to year. Types of current interest in the North are Cannellini, Saluggia and Barlotti. Seed of these and some other varieties has been obtained for trials in 1959. Others should reach Queensland from overseas during the next few months and will be grown in quarantine before release as a precaution against the possible introduction of disease.

Observations in 1958 indicated that few of the culinary dry bean varieties already grown here are sufficiently uniform in plant type for commercial production. Nevertheless, they include a range of material from which strains suited to Queensland requirements can be selected. The present research programme should enable us to assess the potential of the industry which depends primarily on yield per acre, the quality of the dry beans and the practicability of mechanised production and mechanised harvesting.

Basic data of this kind are fundamental to the development of any primary industry on a sound basis.

The experimental programme could well lay the foundation of a new industry in the Burdekin delta.

Certified Tomato Varieties

The certified tomato variety, known as Q3, has revolutionized production in north Queensland. It is largely responsible for the excellent quality fruit now grown in the area.

Less than a decade ago, northern growers were unable to fully exploit market outlets for winter and spring tomatoes. The pink skin varieties grown at that time lacked the quality demanded by consumers. In addition, consignments sent over long distances to southern markets, no matter how carefully graded and packed, opened up in mixed condition. Large quantities were bought at bargain prices and regraded to normal maturity standards before reaching the consumer. Even then, sales were prejudiced by the pink colour of the fruit and its poor internal quality.

When Q3, a certified line bred by the Department of Agriculture and Stock was released, its possibilities were immediately realised by northern growers. This variety offered fruit with good internal quality and an attractive dark-red skin, and a bush with sufficient foliage to protect the fruit from sunburn during hot weather. Even though commercial production of Q3 in the north involved considerable changes in production methods, it is now widely grown along the coast from Mackay to the Atherton Tableland.

At Bowen, Q3 is the main variety planted for the mid-season and late-season crops harvested from August to October. The quality of tomatoes sold to local markets in north Queensland has never been better and growers in that area can compete with confidence on the more competitive southern markets.

Tomato varieties are very prone to "running-out" in the tropics and certified seed of Q3 is produced at Stanthorpe under the supervision of Departmental officers primarily for use by northern growers. This is a classic example of inter-district co-operation.

Banana Hazard Removed

Control of leaf spot and speckle in bananas has removed one of the biggest hazards in banana growing in north Queensland, Mr. Madsen said. Efficient control has been made possible by the recent development of a suitable fungicide-oil spray by Mr. W. Pont, an Agriculture Department plant pathologist.

Leaf spot and speckle greatly reduce yields in banana plantations. Both diseases attack the leaves of the plant.

Mr. Pont had been working on the problem in north Queensland for about eight years. He had found that the fungicide-oil mixture, applied as a high volume spray, gave spectacular control. Treatments have to be carried out every month from December to May.

As a result of this work, Agriculture Department officers are now in a position to give definite recommendations to growers on the use of the new spray.

So far, Mr. Pont's work has been based mainly on high volume spraying. Work is now proceeding to compare misting and fogging as alternative methods of applying the treatment.

Growing Wheat For Milling

By W. T. KELSO,
Senior Cereals Chemist.

Wheat farmers can help to improve our flour and bread by understanding the meaning of quality in the grain they grow. Information in this article will assist towards such an understanding.

During recent years interest has been intensified in raising the quality of wheat for milling purposes. Growers, with the knowledge of huge surpluses of wheat in the world, have decided to attack this quality problem and for this purpose they are levying themselves on the number of bushels produced. Such levies are subsidised by the Commonwealth Government. Growers realise that, in the face of strong world competition, the best quality wheat is the one most likely to be sold.

Wheat occupies the most important position among our cereals, because no other cereal contains the properties required for bread making. Disregarding the rice consumption of the Asiatic races, it is the staple food of the world.

Wheat can be grown in almost any soil and in the cool and cool-to-warm temperate climates. Its origin dates back to prehistoric times.

Normal wheat is reasonably uniform in shape and colour and this suggests uniformity of composition. Nothing could be further from the truth. In any one season in Queensland, wheat can be obtained ranging in protein content from 8 to 16 per cent., a variation which is unequalled by any other cereal.

For many reasons we accept the quantity and type of protein as being indexes of wheat quality. Starch, which is the largest constituent in wheat grain, is essential for dough formation. Its significance in relation to wheat quality is however, beyond this discussion.

Harvest Time

Due to the possibility of storms, wheat is usually delivered to the receiving depots with the utmost speed. The larger growers, equipped for bulk handling, deliver in bulk but they may hold some of the harvest in their silos for subsequent delivery. The remaining growers forward their wheat in bags.

The Queensland State Wheat Board carries out a classification on a visual basis at all their depots, and the grades of wheat known as Q1, Q2, Q2A and feed wheat correspond to prime milling wheat, good milling wheat, inferior milling wheat and stock food wheat respectively. Feed wheat is segregated and if possible Q2A also.

However, it must be borne in mind that although three grades of milling wheat exist by this classification, only one grade of milling wheat (composed of Q1, Q2 and Q2A) is forwarded to the millers.

Plate 1

A Modern Multiple Bin Silo of the Queensland State Wheat Board.

Segregation of wheat on a quality basis is a complex operation, involving specialist techniques, statistical data and speed of estimation. This latter factor makes it essential for the segregation to be largely carried out before the wheat reaches the depot.

Arrival at the Mill

The incoming wheat is first identified for variety and district of origin, and a knowledge of these two factors, when combined with the appearance of the grain, permits an approximation to be made of the quality. According to the manner in which the wheat is received, whether in bags, in bulk of one variety or in bulk of mixed varieties, so does the task of making a classification become increasingly difficult and in the latter case, almost hopeless. Detailed chemical and physical tests are necessary for accurate classification and cereal chemists are employed at the mills for this purpose.

The principle of milling is based on the marshalling of wheat into its various quality ranges and the good must be used with the bad in such proportions that the specifications of the flour are adhered to within reasonable limits. This goal is not always attainable, particularly in a season when, for climatic reasons, the overall crop has been reduced in both quantity and quality.

The Miller's Products

The protein contents of a miller's products in Queensland would approximate to the following values—

1. Ordinary baker's flour—11%–11·5%
2. High protein baker's flour—13·3% minimum
3. Self raising flour—9%–10%

4. Biscuit flour—7·5%–8·5%
5. Special flour, cake, etc.—7·5%–8·5%
6. Bran and pollard—14%–16%

These protein figures would be the average over the year and based on 13·5 per cent. moisture. Depending on the season, these standards may not be atttainable and additions of dried protein to the high protein baker's flour may have to be added by the bakers, in order to conform to the requirements of the Act. Queensland does not produce biscuit flour to any extent, due to the harshness of the quality of the protein of the poorer protein wheats, and so importations are made from southern States. Biscuit flours should not have a high protein content.

Type of Protein

In the various categories listed, protein ranges have been included, but the specifications for these flours are more detailed than protein content. It is important that the correct type of protein is present at any one level of protein quantity. Actually the two requirements are considered simultaneously in order that a balance may be preserved between the type of protein and the protein content. Certain types of protein are often undesirable in some varieties in the high protein range. As protein contents are reduced, the type of protein still remains important, for a correct protein type allows reasonably good bread to be baked at the lower protein levels. This would not be possible if harsher protein types were present.

The type of protein is fundamentally controlled by the variety when all other variable factors are excluded. Wide variations in the type of protein can be produced, usually for the worst, from the hot and dry climatic conditions usually experienced from flowering time to harvesting time. Variations in soil fertility, while mainly affecting the quantity of protein also affect the type of protein.

The varieties Charter, Festival and Puora, which are usually in the high protein range are inclined towards a very strong type of protein. When they are grown on very fertile soils, the tendency is to produce an undesirable protein type. Climatic conditions also adversely affect these varieties more than others.

When bread is to be made by modern machinery methods, strong, undesirable type protein causes complications in the bakery and does not allow a good quality loaf to be produced.

There are three main types of protein—Weak, medium strong, and strong. In each of these types, the protein can be elastic, strongly resistant to stretching, or have intermediate values. Therefore, we have a considerable number of classes of protein, each in their turn reacting differently in the bakehouse.

An indication of the different qualities of flour can be gained by making a dough and noticing the resistance it offers to kneading, and how much working the dough will withstand before the elastic properties break down.

In bread baking today, we are faced with two different baking processes:

1. The mechanised baker of the city
2. The manual baker of the country.

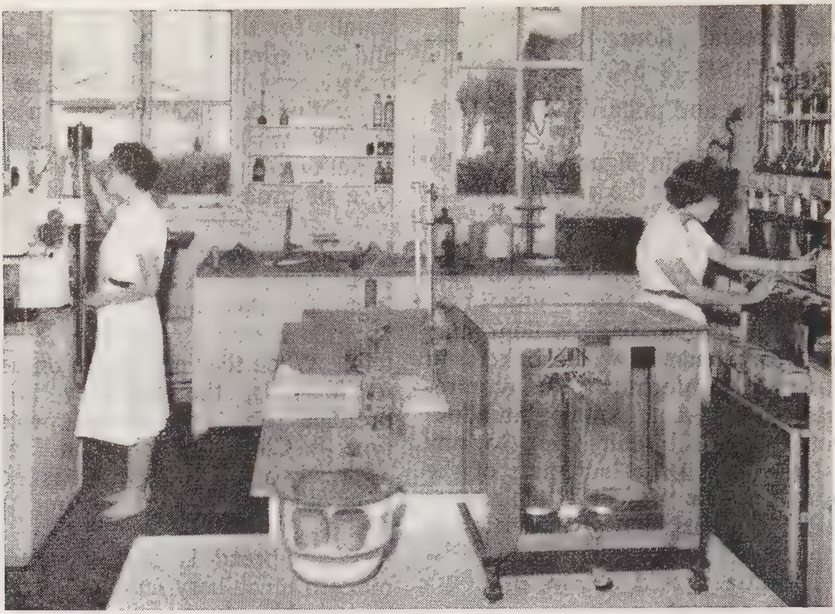


Plate 2

Section of a Mill Laboratory Showing Protein and Physical Testing Apparatus.

For the normal operations of the mechanised bakery, a flour of reasonably-well-defined specifications is desirable. Admittedly, the mechanised baker can handle variations in quality, but he cannot handle them successfully and this militates against the quality of the bread produced. The manual baker is able to modify his baking procedures to suit the flour, and so his demands on quality tolerances are not so exacting.

The Miller's Problem

The miller's objectives are to maintain the standard of his products at as high a level as possible. He is in business for this very purpose and in a highly competitive industry at that. Having no say in the quality of wheat he is given, he carries out a blending procedure based on a district, varietal, appearance classification together with information from the cereal chemist.

How Growers Can Help

The first thing growers should realize is that wheat is grown mainly for the production of flour, predominantly for bread-making purposes. If growers supply inferior wheat, the millers still have to use it and hope that it can be blended with superior wheat. The miller is the intermediary between the grower and the baker and through him the primary product is converted to a secondary one. No one has ever baked a good loaf of bread from a poor flour.

Secondly, growers should not be unmindful of the fact that they are selling a product of an indiscriminate nature. While it is essential to harvest a crop with as high a yielding capacity as possible, thought should also be directed towards the manner in which this wheat is to be used. The Royal Agricultural Society in Toowoomba has given

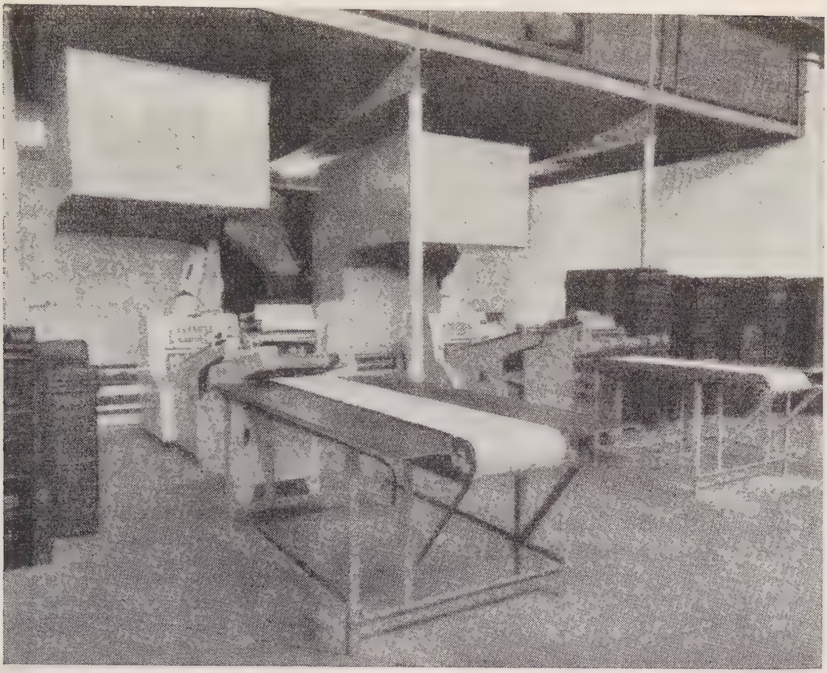


Plate 3

A Section of a Modern Machine Bakery.

invaluable publicity to the quality of our Queensland wheat through the medium of its annual competition for the Best Bushel of Wheat.

Growers are advised to study the results of this competition which appeared in the Royal Agricultural Society schedule of entries and the appropriate newspapers, particularly in regard to the variety Festival.

Admittedly, as long as growers receive the same price for quality of an indefinite nature, then it becomes difficult for them to realize the problems of the milling industry. If at any future time, wheat premiums are paid in this State on a bread baking quality basis, then the progressive grower will be more equipped to produce wheat which will attract these premium payments.

Fortunately in Queensland we have had three excellent varieties in Lawrence, Gabo and Spica, and when these varieties are grown in suitable environments, they produce a flour satisfactory to the miller and the baker. Likewise, in a lesser degree, we have had Koda, Charter, Puora and Festival. With these four latter varieties we are representing the high protein, strong to very strong wheats, in which unfavourable environment produces undesirable quality. Although these wheats are necessary in the production of high protein flour, the variety Festival, on account of its inherent inferior type of protein, should have a very small place in the miller's grist, amounting to about 5 per cent.

Emphasis should be placed on growing more of the extensible type of protein wheats, such as Lawrence and Spica, in the better class areas of the State, which at the present time are given over largely to the growing of Festival. When we take the case of Festival planted to represent 20 per cent. of the acreage, the miller can easily have 40 per cent. of this variety in his grist for bread flours. This results when the wheats unsuitable for breadmaking because of their lower protein content, are segregated and the higher protein wheats rise in proportion in the milling blend.

There are two solutions to this problem, listed in order of preference—

1. A substitute wheat is necessary, equalling or approaching the excellent agronomic features of Festival combined with a good type of protein.

2. Festival could serve as a good export wheat to those countries whose main interest lies in the quantity and not the quality of the protein. In this way a balance of home consumption Festival to export Festival could be achieved. Using this method, it is imperative that the standard of the home consumption wheat does not fall and this could only be achieved by increased sowings of Lawrence and Spica.

* * *

Fertilizer For Tobacco

FARMERS will have decided which portion of their farm they are going to use for next season's tobacco. They have been thinking about the type of fertilizer to use and also the amount per acre.

The wrong type of fertilizer can reduce the yield or the quality of tobacco leaf. It is, therefore, a good idea to discuss this matter with an advisory officer before deciding on the type to use.

The benefits from fertilizer depend upon many factors, all of which work in together to produce the final result. A few points are listed:

1. The soil contains a lot of plant food. Fertilizer helps the plants to overcome some deficiency or to balance some excess. Do not disregard the plant food already in the soil.

2. Some of this plant food is readily available to the crop. Some of it becomes more slowly available. Quite often, these amounts depend on the previous use which has been made of the field. This must be carefully considered.

3. To get the plants to use the fertilizer at the proper time, they need soil moisture. If they are starved for moisture for any length of time the fertilizer can scarcely be blamed for low quality leaf.

Tell an advisory officer all about your field before you ask him which type of fertilizer he would recommend.—*E. J. McDONALD, Adviser in Tobacco Culture.*

Plate 1: Irrigated Pastures at Gat
Regional Experiment Station's Fat La
Trials.

Irrigated Pastures For Fat Lambs

By C. A. SCHRODER,
Assistant Irrigationist.

IRRIGATED pastures in the Lockyer Valley last year carried 12 ewes and their lambs to the acre and turned off high quality lambs after four months' grazing at an average 31 lb. This performance, recorded in a trial at the Gatton Regional Experiment Station, shows that fat lamb raising has a future as a worthwhile sideline to Lockyer Valley farming.

Outstanding features of the trial were:

The very high percentage of lambs delivered for slaughter to ewes mated.

The absence of deaths after the day of birth.

The fast overall growth rate.

The percentage of lambs delivered (at the required slaughtering weight) to the total ewes mated was 148.

Every lamb surviving the day of birth was successfully reared to the required slaughter weight.

Of the lambs slaughtered, 71 per cent. were suckling at the rate of two per ewe.

Lambs by Dorset Horn sires reached the required weight in an average of 93 days, and by the Southdown sires in 97 days. The fastest growing lamb dressed 35 lb. at 56 days.

Plate 2

Ewes With Lambs 7 to 9 Weeks Old, Grazing Irrigated Pastures.

There is Profit in This

The average gross return from each ewe mated was £5 3s. for the season from lambs. This is apart from wool value.

Irrigated pastures were used only during the period from just prior to lambing until the lambs were delivered for slaughter. This was the four-month-period, August to November. During this period the pastures carried 12 ewes and their lambs to the acre and yielded a calculated gross return from the lambs of £62 per acre.

For the remainder of the year, the irrigated pastures were used for the milking cows. In this period the ewes were grazed chiefly around head ditches, drainage lines and laneways.

Due to the succulent condition of the pastures, a small amount of hay was provided for the ewes, when suckling lambs.

Allowing a pasture to be down for 4 years as part of the farm rotation programme, the total cost of production for the months August to November is estimated at £5 17s. 8d. per acre annually. This cost includes the preparation of land for surface irrigation, pasture seeding, and the cost of irrigation, including plant, pumping costs and labour.

The Irrigated Pastures

The irrigated pastures used in the trial were those grown normally on the Station.

They comprised paspalum/white clover; H1 ryegrass/cocksfoot/white clover; H1 rye/*Phalaris arundinacea*/white clover; para grass/strawberry clover; and sub clover/wimmera rye pastures.

These pastures were in very good condition, being vigorous, fast growing and of very high food value. Measured on a dry weight basis, the average protein content was in the vicinity of 20 per cent. The proportion of clover to grass was approximately 65:35.

Pastures of this type maintain an annual production on the Station of approximately 40 tons of green pasture to the acre. They are at their best during mid-August to early December. In this period the average weekly green growth rate exceeds 1 ton to the acre of very succulent and highly nutritious pasture, eagerly grazed by sheep and cattle. The provision of a carbohydrate concentrate, good quality dry hay, or access to an unirrigated pasture, is beneficial, and also makes the area of irrigated pasture "go further".

Management and Costs

Irrigated pastures of the type and quality outlined are not difficult to produce in the Lockyer Valley. It is imperative, however, that they be properly managed from a grazing angle and that good irrigation practices be maintained.

The necessity to avoid heavy grazing, or over-defoliation, of the pasture, and to maintain satisfactory moisture throughout the root zone can never be over-emphasized. Failure in either point will quickly reduce growth rate and quality, and thus the carrying capacity and food value of the pastures.

Irrigated pastures will persist and give high production for many years. However, on the Station they are grown as part of a rotational cropping programme. In this way the life of a pasture is usually reckoned at 4 years. This length of time allows a good grazing return while the benefit rendered to the soil results in much improvement in subsequent crops.

All pasture irrigation at the Station is by surface application.

Costs are given very briefly as follows:

Pasture Establishment

	An Acre £	*s.*	*d.*
Land preparation, including the provision of head ditch	8	0	0
Irrigation outlet boxes ..	2	0	0
Pasture seed	3	0	0
Total	13	0	0
Cost per year for a 4-year pasture	3	5	0

Irrigation

The cost of surface irrigation on the Station, including capital cost of plant, pumping and labour costs, is about 8s. an acre-inch. Perennial pastures in the Lockyer Valley normally require approximately 36 in. of irrigation annually in addition to rainfall.

This works out at £14 8s. an acre a year.

Annual Costs

It will be seen that the total annual costs, including establishment and irrigation are £3 5s., plus £14 8s., or £17 13s. an acre. These costs cover the full year, whereas in the lamb trial the irrigated pastures were used for four months only.

Thus the total annual costs for the pasture used in the trial was one-third of the costs for a full year (one-third of £17 13s.) or £5 17s. 8d. an acre.

Spray Irrigation

Some farmers may prefer to spray irrigate rather than use surface methods of application. In some instances, land surfaces or soil type may make spray methods essential.

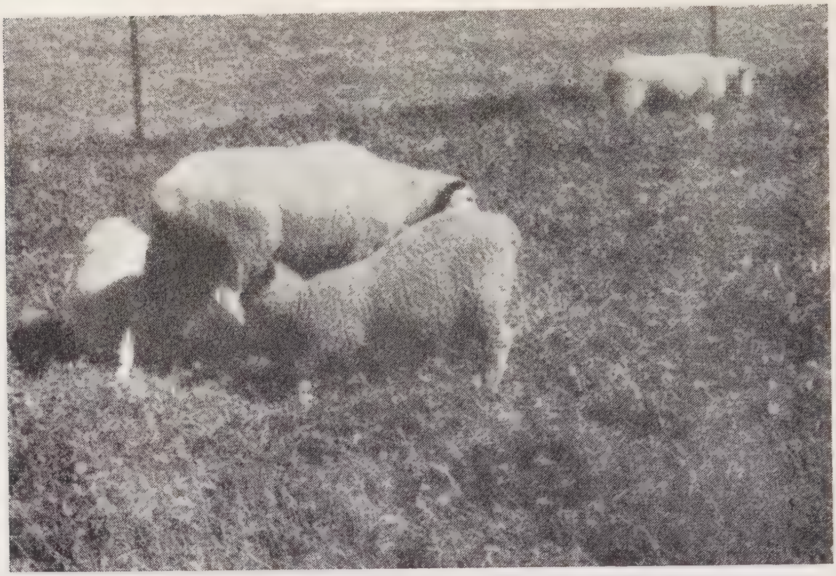


Plate 3

Multiple Births of Strong Lambs Is the First Step Towards High Profits.
These Twin Lambs Are 7 Weeks Old.

Spray irrigation reduces the cost of land preparation. However, it requires a more costly plant, increases power and labour costs and altogether means a slightly higher overall annual cost of producing the pasture.

Experiments at the College

Fat lamb trials have been in progress for 20 years at the Queensland Agricultural High School and College, Gatton, under the direction of the Principal, Mr. N. W. Briton. The early part of the work comprised breed trials. These were completed in 1948.

Of the various pure breeds and crosses used, Border Leicester x Merino ewes gave the best performance. Dorset Horn and Southdown rams both proved better as sires than the other breeds used.

Southdown sires gave a slightly higher percentage of top quality lambs than Dorsets but on the average they took some seven to 10 days longer to reach slaughter weight, which was about 63 lb. live paddock weight.

It was very evident in the breed trials that lamb growth and carcass quality were influenced a great deal by the nutritive level of the ration supplied to the ewe flock.

In 1948 the scope of the trials was widened to examine the relationship between the level of nutrition, lamb growth rate, and carcass quality.

These trials are still in progress and the merits of various combinations of pastures, including lucerne, are being determined.

Close relationship has been demonstrated between maturity of the lambs and carcass quality. It is most important that the lamb crop be grown as rapidly as possible to ensure best quality carcasses.

The trials at College are carried out under dry-land farming conditions.

Trials at the Experiment Station

Following the successful development of irrigated pastures at the Gatton Regional Experiment Station (formerly the Bureau of Investigation Irrigation Research Station) and the high returns obtained from them in dairy production trials, it was decided to undertake trials at the Station in fat lamb production. These were commenced on January 1, 1956.

The Gatton Regional Experiment Station occupies land belonging to the Queensland Agricultural College. Valuable assistance in the lamb trials has been received from the College Principal both by way of technical advice and the loan of the breeding stock required.

The following is largely a progress report covering the 1958 crop of lambs:

Breeding Stock and Mating

The ewes used in the trial comprised 87 Border Leicester x Merino which were bought as two-tooths at the commencement of the trial in January 1956 and used in the 1956 and 1957 trials. No culling of ewes was practised at any time other than 5 ewes which failed to breed in 1956 and 1957.

Mating commenced on 10-3-58. At this date the ewes were divided into two groups comprising 29 and 58 respectively. One Southdown ram was joined to the first group and two Dorset Horns to the second.

The two groups were maintained separately until 31-3-58. They were then reunited and run as a single flock. On 10-4-58 a further Southdown ram was added. All rams were removed on 28-4-58.

The mating period was thus 10-3-58 to 28-4-58, a total of 49 days.

March 10th was chosen for mating for several reasons.

In an address to the Queensland Branch of the Australian Society of Animal Production, Mr. Briton showed that in the Lockyer Valley mating must be carried out in late January to April if high lambing percentages are to be obtained.

The mating period used made the period of maximum milk demand coincident with the zenith production period of the pastures used. This fact helps to account for the very heavy carrying capacity obtained. Somewhat reduced carrying rates could be expected in other periods of the year according to the pasture seasonal growth rates.

The supply of lambs available to the market usually drops off about October—many of these are produced on grazing crops such as oats on the Darling Downs. This means a keener market for the August dropped lambs which are normally ready for slaughter in October-November.

Grazing

It is rather paradoxical that the Regional Station does not have available an area of pasture poor enough to meet the requirements of dry ewes. Under existing conditions, ewes rapidly gain weight after weaning their lambs and at subsequent mating carry rather more condition than is desirable.

As the lambs of the 1957 crop were weaned in October–December of that year, the mothers were retained in the yards for a week with restricted diet. They were then grazed around head ditches, laneways, and drainage lines. These

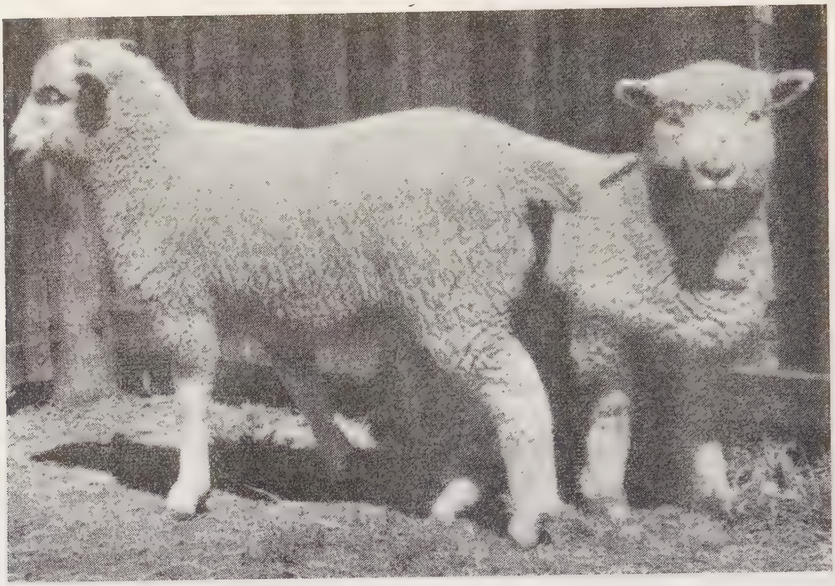


Plate 4

Prime Suckers On the Day of Delivery for Slaughtering. Age 63 days, live paddock weight 63 lb., cold dressed weight 32-33 lb.

areas comprise chiefly Rhodes grass with a small amount of white clover; they are less succulent and of lower nutritive value than the irrigated pastures.

Grazing was continued in these areas until just before commencement of lambing, when the ewes were transferred to irrigated pastures and maintained under a system of rotational grazing until the lambs were weaned.

Owing to the succulent condition of the irrigated pastures a small amount of good quality soft hay was provided during the milking period. Irrigated mixed pasture hay, conserved in the previous autumn and summer, proved very acceptable to the ewes. The maximum amount supplied was two bales a day.

Lambing

Lambing percentage is one of the most important factors influencing the efficiency of a fat lamb production project. A very good lambing percentage was obtained in the trial.

Small paddocks were used and the ewes inspected twice daily during the lambing period.

No attempt was made to mother lambs that were neglected by their dams or unable to fend for themselves.

Unlambed ewes were removed daily or at suitable short intervals. The ewes and lambs left behind in this way were allowed to remain a day or two before being moved to the main group of ewes with lambs.

The first lamb was born on 2-8-58, 145 days after mating commenced.

Lamb Losses

Lamb losses from all sources amounted to 11 per cent. of the total number of lambs born.

A very pleasing factor is that all lambs surviving the day of birth were successfully reared to slaughter weight.

Growth of Lambs

The lambs were delivered for slaughter as they reached paddock live weight of 63 lb. Growth rates were generally very good, quite comparable with trials carried out in southern States with similar breeds on clover/grass pastures. They were particularly good when it is considered that 71.3 per cent. of the lambs slaughtered were suckling at the rate of two to the ewe. Lambs suckling one to the ewe normally make approximately .08 lb. greater daily gain than lambs suckling two to the ewe when grown to 70 lb. live weight.

The first lambs were delivered for slaughter on 7-10-58. They were then 63 days old. Their average cold dressed weight was 31 lb. The fastest growing lamb dressed 35 lb. at 56 days of age. Dorset Horn crosses reached slaughter weight some 5 days earlier than Southdown, which is normal.

All lambs were of very high quality, quite suitable for export.

In the whole three years of the trial, no worm troubles have arisen even though the pastures used are irrigated for maximum production, and though when not suckling lambs the ewes frequently graze wet areas around head ditches and drainage lines.

A regular drenching programme for the ewes is maintained. Worm treatment in lambs has never yet been required.

The ewes were shorn on 4-9-58, when the average fleece weight was 7.4 lb. Previous shearing was carried out on 3-10-57.

Worms Must Be Controlled

Any scheme to produce first quality sucker lambs on irrigated pastures in the Lockyer Valley would appear to be sound provided that steps are taken to control worms in the parent flock. Satisfactory control would appear to require a routine drenching programme, drenching about eight times per year.

Border Leicester x Merino ewes appear to be very satisfactory for producing the lambs. Not only has the lambing percentage been very satisfactory, the ewes have also shown themselves to be good mothers and good milk producers. Southdown and Dorset Horn have both been satisfactory sires.

High quality irrigated pastures are not necessary throughout the whole year. Such pastures are required only from a couple of weeks before lambing until the lambs are weaned. When mating is commenced in early March it should be sufficient if irrigated pastures are available during the four months August to November.

The irrigated pastures used are the normal type recommended in south-eastern Queensland. In the four months they were used they maintained 12 ewes and their lambs per acre.

The total cost of producing this pasture for four months each year is about £5 17s. 8d. an acre. This includes land preparation for surface irrigation, pasture seed, irrigation plant, power and labour.

On 1958 lamb values, a gross return of £62 an acre was obtained from the sale of lambs.

The average gross return from each ewe mated was £5 3s. for the season, apart from wool value.

Plate 5

Ewes Grazing Subterranean Clover Pastures Just Before Lambing.

Acknowledgement

Acknowledgement is made both for the assistance rendered by the Principal of the Queensland Agricultural High School and College, Mr. N. W. Briton, in furnishing the details of the fat lamb production work carried out by him at the College, and for technical advice in the planning of the trials. Very practical assistance has also been received from the College in making available the necessary breeding stock for the trials. The sucker lambs produced were delivered to the College when ready for slaughter.

◆

Veldt and Mitchell Grasses

Question: A Dalby farmer asks about planting methods and rates for Unarlee veldt and Mitchell grasses.

Answer: Veldt grass has been used in Western Australia to stabilize poor country. In such regions, the grass receives a winter rainfall which favours its best growth. Heavy grazing is not good for veldt grass as it has the habit of developing its crown well above ground level, making it very liable to damage during grazing. It should be planted in autumn at the rate of 3 lb. to the acre.

Unarlee veldt grass is an improved variety, but results in Queensland have not been highly successful as it seldom persists well.

Mitchell grass produces seed which is liable to clog the tubes on standard drills unless special precautions are taken as with buffel grass, so it is better to broadcast. The rate of planting is about 2 to 3 lb. to the acre, and the best time to plant is early in the wet season.

Bucket and Bail

Super for Pastures. Coastal dairymen, topdress your winter pastures with superphosphate in late autumn or early winter, and you'll increase forage yields in August and September.

Many of the soils in the higher rainfall, coastal dairying districts of south Queensland are known to be lacking in phosphorus. Numerous trials carried out in recent years by Agriculture Department officers have demonstrated the benefits of topdressing such winter pastures with superphosphate.

Superphosphate will stimulate the growth of the perennial legumes such as white clover in your pastures. It will also assist seedling clover development, giving a dense stand.

Buy your superphosphate early and have it on hand to apply immediately after the first good rains in late autumn or early winter. The most economical rate to use superphosphate on winter pastures is 2 to 3 cwt. an acre.

A clover pasture, stimulated with superphosphate in early winter, will give a vigorous response as soon as the coldest weather is over. Plan your spring feeding programme now, by making sure your white clover pastures are kept healthy and productive.

—*A. HEGARTY, Agrostologist.*

Ropy Cream Can Be Prevented. Farmers who have to depend on dams or creeks for watering their stock are often troubled with ropy cream. Cream in this condition is down-graded, reducing the farmer's return.

Ropy cream is caused by water-inhabiting bacteria. These bacteria are enclosed in jelly-like capsules. When they multiply and mass together, the capsules make the cream less fluid. On stirring, the masses of joined bacteria capsules can be seen as fine threads or ropes.

The bacteria that cause ropy cream are most frequently found in dams and stagnant water. When the cows wade into the water to drink, they pack up the bacteria on their udders and flanks. The milk is likely to become contaminated unless their udders are washed with a chlorine solution before milking. Sometimes these troublesome bacteria are also found in the water tank attached to the dairy shed.

If you have trouble with ropy cream, attack the problem first by fencing off from stock all dams and lagoons to prevent the cows wading in them. Equip all surface watering places with a windmill or pump and water trough. If your water supply tank is concreted inside, chlorinate the water by adding 1½ cups of sodium hypochlorite to 1,000 gallons of water.

Always chlorinate the cold water you use in the dairy, and pay strict attention to udder washing, using a chlorine rinse. Ensure that all washing-up water is boiling so that the bacteria will be killed. Because of their jelly-like capsules, these bacteria are more heat-resistant than other types, so you should take care that the water used for sterilizing is actually boiling. Check that the tubes through which the water circulates in milk or cream coolers are free from water leaks.

If these precautions fail to eradicate the cause of ropy cream, consult your local Dairy Adviser.

—*N. E. FOWLER, Dairy Officer.*

Plan Now For September

Join a Herd Recording Group to find out which cows are profitable.

Construct a bull paddock to enable controlled mating.

Check the operation of the separator to ensure accurate skimming.

Adopt machine stripping of cows to save time without milk losses.

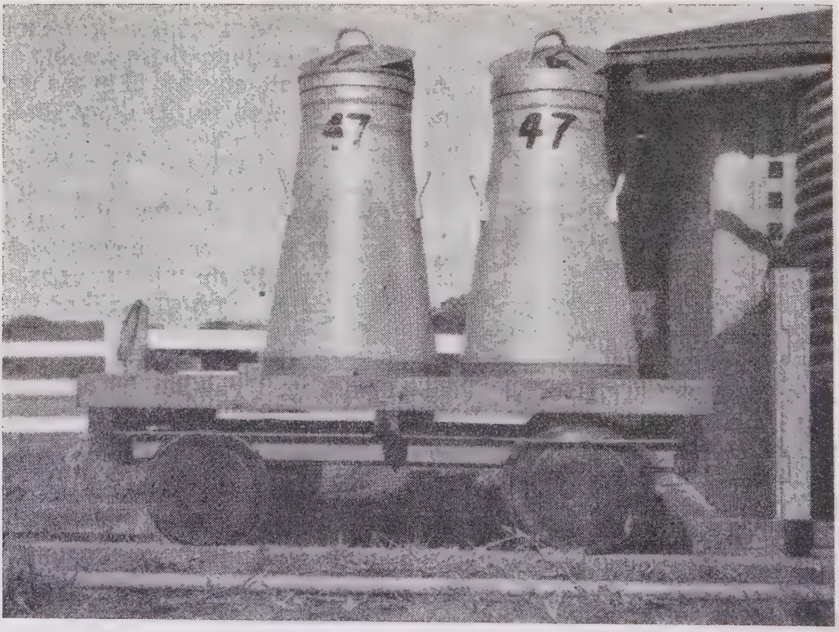
Paint dairy premises.

Prepare land for summer crops.

Top-dress pastures.

◆

This Shows Ingenuity



Mr. J. Tramacchi, of Cedar Pocket, Gympie District, Built This Very Efficient Milk Trolley, Using Old Brake Drums (From a Car) For Wheels. These drums run very well on wooden rails, carrying the cans that convey milk for Nestles Milk Factory.

Infertility Causes Heavy Dairy Herd Wastage

By **A. R. McTACKETT,**
Cattle Husbandry Branch.

A SURVEY of the breeding performances of Queensland dairy cattle has revealed a high rate of infertility. It has also drawn attention to the heavy herd wastage that infertility causes.

In a two-year study of nearly 10,000 *cows in* 127 *herds, it was found that* 30 *per cent. showed some form of infertility. Over the period,* 40 *per cent. of the cows culled and* 28½ *per cent. of those retained in the herds had infertility troubles.*

The survey was commenced five years ago by the Department. One of its aims is to determine the amount of infertility in dairy cattle. But what exactly is infertility? Many people working in the dairy industry think of infertility simply as cows returning to service or being difficult to get into calf. Returns to service are the most important cause of infertility but other disorders also prevent the regular calving of cows.

High fertility means the ability of the species to reproduce itself regularly. For dairy cattle, regular calving at the most suitable period of the year is desirable for both economic production and high yields throughout the life of the cow. The right time to calve the herd, as dairymen well know, depends on whether the farm is devoted to butter or wholemilk production.

Calving Not Regular

Infertility, therefore, occurs when cows do not calve regularly each year according to the needs of the particular farm. A number of cows in the herd calve late or are carried over till the following season not in calf. The result is that these cows spend excessively long periods in the "dry" paddock.

The effect of infertility on farm returns depends upon the proportion of the herd which fails to calve annually. It is considered that cows with intervals between calvings of over 390 days have shown evidence of some form of infertility. Exceptions occur where cows are deliberately withheld from service in order to have them calve at a more suitable period of the year for the type of dairy production (milk or cream) that is being catered for on the particular farm.

The selection of calving intervals of over 390 days as evidence of infertility is based on expected annual calving. Cows that require over 390 days in which to calve again lose one month or more of their potential productivity for that year. The longer the interval the more production is lost.

A calving interval of 390 days allows a period of two to three months for conception. In cows that are functioning normally, at least two services could take place during this period which is critical for regular calving.

To assess the incidence of infertility, the records of the cows in the survey have been studied and those with calving intervals of over 390 days have been selected and the reason for the long interval determined. This method was also chosen in assessing infertility among cows that were mated and later culled except that, naturally, the predicted calving date was used to determine "expected" calving interval.

Four Reasons

There are four reasons why cows fail to calve regularly every year:

1. They need more services to get in calf than should be necessary—Service Return.

2. They do not return to service at normal 3-weekly intervals when not in calf, the periods between heats being long or irregular—Long Cycles.

3. They do not show heat soon enough after calving to get in calf and calve again within a reasonable time—Anoestrus.

4. They abort and subsequently do not produce to their full capacity—Abortion.

Intervals between calvings may, of course, be prolonged when cows are withheld from service in order to calve them down at more desirable times of the year. In the herds surveyed 6½ per cent. of the cows that were kept had long intervals between calvings due to such management practices only and showed no evidence of any infertility problems.

30 Per Cent.

Altogether there were 8,284 cows retained and 1,276 cows sold or died after mating in the 127 herds surveyed. Of the retained cows, 2,489 or 30 per cent. required periods of over 390 days to calve normally again. A further 429 or just over 5 per cent. aborted. When long intervals due to management alone are not counted, 2,374 or 28½ per cent. of retained cows showed some form of infertility.

Using estimates for cows that were mated and later sold, the amount of infertility in the 1,276 cows involved was determined. Not counting those that were held back from service with no evidence of infertility, 508 or 40 per cent. of the wastage cows showed some form of infertility. This is much higher than in the case of retained cows and clearly reveals the importance of infertility in herd culling programmes.

In addition to the high incidence of infertility in mated cows, quite a number that are sold or die before service also show signs of disorders of reproduction. Cows are often sold following abortion or failure to clean up after calving. Occasional deaths occur due to difficult parturition. Some cows may dry off before coming in season and are sold to avoid keeping such dry cows for long periods before they come into production again. These cows have not been included.

The proportion of infertility of the four major types is given in Table 1 both for retained cows and for cull cows. The figures add up to over 100 per cent. because in some instances more than one factor has been involved, for example, service return followed by abortion or failure to show heat within a reasonable time after calving followed by service return.

TABLE 1

THE MAIN REASONS FOR PROLONGED CALVING INTERVALS IN 2374 RETAINED COWS AND 508 CULL COWS.

Reason	Retained Cows	Cull Cows
	Per cent.	Per cent.
Service Return..	41·2	67·5
Long Cycles ..	14·7	17·9
Anoestrus ..	39·2	30·5
Abortion ..	18·4	..

Service return was the most important reason for long intervals between calvings and was especially important in culled cows. Delays in the onset of heat after calving were common in some areas and were responsible for a high proportion of long calving intervals. Abortion accounted for over 18 per cent. of the long intervals. These cows would have to get into calf and calve again before returning to normal production levels.

Of all the retained cows nearly 5½ per cent. aborted. A further 1 per cent. of cows had dead calves. These losses represent a depression of fertility and lead to reduced production. At the same time there are fewer calves from which to make selection of replacements.

Long cycles between heats were responsible for the least number of prolonged calving intervals. But these cycles cause considerable upsets in breeding programmes. Cows are thought to be in calf and unexpectedly return to service. Some may even be dried off and fail to calve when they are due. Instead of calving they may come in season.

No doubt in some instances an abortion has been missed but in far more cases there is no evidence of abortion. When service return and long cycles occur together a heavy strain is thrown on the patience of the dairyman with this particular herd problem.

Diseases

A considerable amount of the infertility occurring in dairy cattle can be attributed to infectious diseases of the reproductive organs. These diseases lead to service return, irregular cycles between heats following service, abortion, and secondary infection of the breeding organs after abortion or retained membranes.

The main infectious diseases occurring in Queensland dairy herds are:—

1. *Brucellosis* (*Contagious abortion*): The chief symptoms of brucellosis are abortion, especially from 6 to 8 months, the birth of dead calves at full term, retained membranes and secondary infection of the breeding organs causing discharges that are foul smelling. Service return may follow particularly after an abortion "storm" in recently infected cattle. In herds that have been infected for some time, abortion may not be prevalent in older cows but young stock are especially prone to abort. Older infected cows will continue to spread infection even at a normal calving.

There are no effective methods of treatment for brucellosis once it is established. Most efficient control can be achieved by the use of Strain 19 vaccination of heifer calves preferably at from six to eight months. While a protected herd of vaccinated stock is being built up attention should be given to hygiene to reduce the spread of infection within the herd, for example aborted calves and cleanings should be burnt or buried in lime, and affected cows isolated.

In cases where an abortion "storm" due to brucellosis occurs, vaccination of adult cattle with Strain 19 may be adopted under the supervision of a veterinary surgeon.

2. *Leptospirosis*: Abortion "storms" over a period of six to eight weeks may be due to infection with leptospirosis. There are usually no other symptoms of infertility associated with the abortion. Cows clean up without any trouble and no difficulties occur in getting them back in calf.

At the moment there does not appear to be any particularly effective way of dealing with an outbreak of leptospirosis. The aim should be to blood test affected cattle to find out the actual cause of the abortions so that appropriate steps can be taken to control it.

3. *Vibriosis*: Unlike brucellosis, which is contracted by cows grazing over contaminated pasture, vibriosis is spread at service. This disease is widespread in the State and leads to serious service return problems.

The most important symptom is service return with cycles between heats of irregular length. Early abortion at from three to five months occurs but later abortion may also occur. Discharges may be noted within 48 hours after service. Following abortion a discharge of thick yellowish pus may be passed but there is usually no bad smell nor retained membranes associated with it.

Methods of control and treatment of infected bulls and cows with antibiotics have given some encouraging results. Difficulties with the control of bulls through lack of bull paddocks and with straying stock often hamper the operation of effective control measures.

4. *Trichomoniasis*: Although trichomoniasis has been diagnosed in Queensland, it does not appear to be prevalent. Symptoms of service return with irregular, often long cycles between heats and occasional abortion are the main features when trichomoniasis enters the herd. This disease also is spread through the herd at service.

5. *Vaginitis*: Vaginitis is not now considered to be as important a cause of service return as it once was, but this disease can lead to upsets in the breeding programme. The infection is spread at service and will cause inflammation of the breeding organs of both bulls and cows. Service return and discharges, often matting the hair of the tail, occur. In the acute stages, the lips of the vulva often swell and the tail is carried to one side. At this time the passage will also show inflammation with a dense crop of small granular elevations running together along the sides of the passage.

Various treatments are available, including douching with zinc sulphate. When treatment is undertaken the bull should also be treated.

Pamphlets giving more details of these diseases are available free from the Department of Agriculture and Stock, Brisbane, or from veterinary officers in rural areas.

Other than the diseases mentioned, dairymen should be on the lookout for sterile bulls. The majority of service returns following the use of a sterile bull are at more regular intervals (that is, intervals of 18–24 days) than returns following service during an outbreak of vibriosis or trichomoniasis. The results of the survey indicate that totally sterile bulls are not very common. They are fairly easily detected if proper attention is given to herd breeding records.

Season and Nutrition

Seasonal factors in relation to service return occur but these are usually not sufficient to cause the severe interference with planned breeding programmes that any of the diseases mentioned will cause. Analysis of herd breeding records supplied by dairy farmers has shown that fertility is slightly depressed during the summer from December until April and that fertility then improves during the winter and spring.

Differences may occur between districts but these differences are insufficient to affect the general trend for the State.

The part played by nutrition in fertility is being studied. Indications from investigations to date are that the incidence of long delays in the onset of heat after calving is more closely associated with the general level of nutrition than with specific deficiencies of minerals or other nutrients.

The highest incidence occurs in cows that calve in the winter months when there is a shortage of palatable feed.

As a result of inadequate nutrition at the period of maximum milk production following calving, appearance of heat is often delayed until feed supply becomes adequate after summer rains. Supplementary feeding to provide a ration adequate in all nutrients is the only way to overcome this condition of winter anoestrus. Treatment to bring affected cows in season has proved disappointing, especially in the absence of some supplementation.

How Is It Recognised?

There are several useful aids in the recognition of the presence of infertility disorders in a herd. The first essential, however, is to keep adequate breeding records. All calvings and abortions and service dates should be accurately noted in a book or on a chart. Whichever is used, consideration must be given to the use of something that is substantial enough to stand up to the vagaries of the weather. Provide some kind of protection for the records, too.

It is of great advantage to keep a full record of all heats following calving whether service has occurred or not. When service occurs the bull used should be noted against the date of service. If a stray bull serves a cow or if the herd sire serves a neighbouring cow these facts should be recorded. Such records often indicate how and when an infection has entered the herd.

With the help of these records, quick checks can be made of herd breeding performance at any particular time. Cows that have failed to come in season within 60 days after calving can be identified. The number of abortions occurring during various months can be determined. The number of cows returning to service, the number of services required for conception and the intervals between heats are easily determined.

By making use of such records it is a fairly simple matter to decide whether there is an infertility problem in the herd or not. Often by examining the records a good indication of the likely nature and cause of the trouble can be obtained.

Early detection of infertility in the herd will assist greatly to minimise its effects. The simplest way to recognise trouble with service return is to consider the results of the first 10 services. If five or more of these cows return to service then some effort should be made at once to find out the reason and an infertility investigation should be carried out by a qualified veterinary surgeon. If two or three of these cows return six weeks or more after service it is advisable to have some examination of the herd made.

Particular care is necessary when a new bull or replacement cows are introduced. A close watch of mated cows for at least 48 hours following service to discover evidence of discharges often reveals early signs of the introduction of infection.

Steps In Control

1. Keep accurate breeding records.

2. Feed dry cows adequately. Don't leave them out in a poor quality, dry paddock and forget them.

3. Bring dry cows in handy to the dairy about a month before they are due to calve, and watch for signs of calving.

4. Keep bulls in bull paddocks and hand mate.

5. Keep cows and bulls away from wandering cattle.

6. Carefully watch cows after service for signs of discharges.

7. Recognise the presence of trouble and get advice early. Don't wait until the end of the mating season, when it is too late.

8. Don't run the risk of introducing diseases of the reproductive organs with purchased bulls. Before they are used in the herd, it is advisable to have bulls treated by douching the sheath with antibiotics. If possible, they should also be test mated with three or four virgin heifers in order to detect whether they are carriers of diseases such as vibriosis and trichomoniasis. These precautions will greatly reduce the risk of infecting the herd. It is far easier to take steps to prevent the entry of these diseases into the herd than it is to cope with them once they become established.

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Longer Life For Dairy Rubber

Absorption of butterfat by dairy farm rubberware is a major cause of inefficient milking and contamination of milk and cream by bacteria. Only constant care will improve the efficiency and extend the life of dairy rubberware.

Most types of rubber used in dairy equipment readily absorb fat. This causes the rubber to swell and accelerates the damaging effect of sunlight. Cracking and ageing of rubber lead to inefficient milking and form ideal sites for the growth of bacteria.

The rubber flaps on the releaser spit chamber are often swollen from fat absorption. This may allow air to be drawn into the releaser, causing frothing and carry-over to the vacuum tank. In bad cases, the releaser may flood.

The combined action of fat and sunlight on milk tubes and claw rubbers can cause them to crack and swell until they slip off during use. Similar cracking also occurs at the mouths of the teat cup inflations. When cracks form on the inside surfaces or penetrate from the outside, it's time to replace the worn rubber with a sound piece.

No cleaner can prevent completely this absorption of fat by rubberware. But caustic soda will remove a great deal of the fat, especially when the rubberware is boiled in a caustic solution for 10 minutes. This treatment should be carried out at least once a week, using one tablespoon of caustic soda to four gallons of water. Regular care of this kind will pay off in lengthening the life of the rubber and improving the quality of milk and cream.

Another approach in reducing the fat absorption of rubber lies in the use of the new synthetic rubbers. These do not absorb fat so readily as natural rubbers. For this reason, milking rubberware made of synthetic rubber can be expected to have a longer life than that made from natural rubber.

—*R. T. WESTON,*
Dairy Adviser.

Why We Should Look After The Dry Cow

By **W. F. MAWSON,**
Senior Adviser, Cattle Husbandry.

Short lactations and low yields may well be the twin products of a neglected dry cow.

Perhaps you tend to regard the dry cow as something of a burden. She is often put away in a rather poor, distant paddock and then forgotten. She is an illustration of the saying, "Out of sight—out of mind." Yet the care she gets when dry—and especially the feed supply available to her—has a big influence on her production during the next lactation. And her level of production affects your pocket.

The level of production during a lactation depends on several factors. An animal's production is limited by its breeding make-up, and, of course, the quality and quantity of feed obtained during lactation also plays a big part. A third factor is that of the body weight, or condition of a cow at the beginning of a lactation. This is a matter which is often overlooked. It's also one which can be improved without a lot of trouble once it receives thought and attention.

When speaking of cattle, lactation refers to the time over which a cow produces milk after calving and until she is dry again. Studies of production figures and lengths of lactation have shown that a yearly lactation length of 300 days—that is, 10 months—followed by a dry period of about 60 days—two months or so—is the most economical for well-fed cows. That figure of a 10 months' lactation could be regarded as an aim. The present Queensland figure is a good deal shorter than this.

It has been shown that the condition of the cow at calving has a strong influence on the length of lactation. As you can well imagine, there is a similar effect on production. Short lactations and low yield may well be the twin products of a neglected dry cow.

You may ask what are the characteristics of a profitable lactation?

Following calving, your cow should settle down in a week or so and be in comparatively high production. But she won't reach her peak until the fourth to sixth week. At that time you can expect her to be right at her top. She won't hold that level for a long time. In fact, you can expect a steady decline at the rate of about 10 per cent. each month. This typical pattern is referred to as a normal lactation curve. It is expected that the cow will be in calf again after being in milk for about three months.

It would be interesting to check the members of your herd to see how they measure up.

The reaching of a peak of production within six weeks of calving appears to be necessary if satisfactory production is to be obtained. That peak is the door to longer lactations and more economical production. The key to the door is in the care of the cow before calving.

During the time she is dry a well-bred dairy cow will be busy building up stores of fat and minerals in her body. That is, of course, if she gets the opportunity. So we expect her to put on weight and get into a fat, sleek condition. This is a desirable state for a dry cow. After the calf is born and your cow gets down to the business of producing milk she will soon reward you for good care. Surplus weight is converted into milk, so, in effect, she has been storing milk while she has been dry. What's more, she's been storing it cheaply.

Cows which are in poor condition at calving don't climb to a production peak, and there is consequent low production for the whole lactation. The care given a cow for two months before calving has a far-reaching effect. Perhaps it's the most important time of the whole year. If you would like help in planning to provide for the simple needs of your cows at that time you should contact your Cattle Husbandry Adviser.

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Cow Cane as Fodder Reserve

Cow Cane Provides a Valuable Reserve of Standing Feed.

Drawing Up A Dairy Herd Culling Programme

By S. W. IVERS, Adviser, Herd Recording Section.

It appears that many members of herd recording groups have culling programmes in mind but have no concrete ideas on how to go about setting up and carrying out their plans. Here are a few hints that may assist—

(1) Collect all the Annual Herd Summaries of the herd, dissect the production ranges and decide the divisions for three groups. Work around the herd average as a basis for dividing the herd into the three groups, each about the same size. For the top-producing section, select a figure just above the average and for the lower portion a figure just below the herd average. The remainder will form the middle group and will consist of cows producing about the herd average. Make the production margins wide enough to give three sections of about the same number of cows.

(2) You now have a foundation upon which to build your programme. Go through the summaries and put the herd into its categories. Use more than one year's results to give a comparison and more accurate results —it may be dangerous to cull on one lactation only. Don't be hasty— there are so many things that can affect production that a comparison of two or three lactations gives a better and sounder basis for deciding whether to breed from a certain cow or remove it from the herd. Remember that a heifer may be slow maturing and may improve in production in the second lactation. Variable rainfall under Queensland conditions causes fluctuations in the amount of feed available and you must make allowances for this in your comparison.

(3) You may be surprised at the manner in which the herd has been divided. Possibly some of your favourite cows now appear in the lowest bracket and cows you intend to cull are amongst your top producers. So far the planning of your programme has been mechanical. From now on, you must plan with care as a mistake at this stage could mean the loss of a high-producing cow.

(4) Check to see where each cow in the top bracket falls. Is the production consistent and in the same category for each year for which you have figures. If there is a variation and one year's production shows a drop sufficient to change a cow from one group to another, have a look at the other cows in the herd for similar variations. If there is a regular pattern, it could be that there was a drought in that year. Maybe there was a dry spring, or abnormal rainfall affected pasture growth. If it is found that the pattern of production is fairly uniform then the individual cow's decline may be due to a difficult parturition, mastitis, footrot, or milk fever. It is at this part of the planning that the farmer, and he alone, can make a decision regarding the cow. He must be prepared to make allowances for cows affected by conditions which

TABLE 1

CULLING PROGRAMME

Group : Brisbane No. 3

Farmer's Name : A. Smith, Smithtown.

Herd Average : 1957—100 lb. butterfat
1958—108 lb. butterfat

TOP BRACKET over 130 lb. butterfat									
1958					1957				
Age	Cow	Month Calv.	Prod.	Days	Age	Cow	Month Calv.	Prod.	Days
3	5	10	136	240	3	15	10	138	300
	53	11	146	240		17	11	145	210
						47	11	145	210
						59	8	150	240
						89	11	135	300
4	17	12	131	210	4	31	10	140	270
	31	8	134	270		54	6	138	300
	47	10	178	300		79	10	147	300
	59	8	144	300					
	85	11	151	240					
M	8	7	166	270	M	2	10	130	300
	13	8	153	300		8	9	158	270
	19	9	155	300		13	11	132	240
	29	7	147	270		29	8	160	300
	43	8	131	210		61	6	142	300
	61	11	131	300					
	68	7	134	240					
	54	8	160	300					

MIDDLE BRACKET 100–129 lb. butterfat									
1958					1957				
Age	Cow	Month Calv.	Prod.	Days	Age	Cow	Month Calv.	Prod.	Days
2	83	6	127	300	2	5	8	107	240
						32	10	102	150
						41	8	125	270
3	14	10	112	210	3	14	8	123	270
	41	9	129	270		87	11	119	270
	89	10	105	270					
4	15	11	127	270	4	19	11	126	240
	51	6	101	240		55	7	125	300
	55	7	109	270					
	80	11	125	240					
M	2	7	110	300	M	1	10	125	270
	3	7	111	240		47	11	125	270
	30	10	106	180		50	6	119	240
	36	5	121	240		68	7	107	300
	47	11	127	240					
	50	5	113	240					
	66	7	120	270					
	73	6	101	270					
	78	1	100	240					

LOW BRACKET under 100 lb. butterfat									
1958					1957				
Age	Cow	Month Calv.	Prod.	Days	Age	Cow	Month Calv.	Prod.	Days
2	6	7	82	240	2	22	11	58	150
	10	5	67	180		27	2	49	120
	32	6	29	120		74	2	55	120
						84	6	24	90
						88	11	33	120
3	10	4	58	120	3	26	8	61	180
	22	12	73	150		82	6	78	240
	27	11	80	180		83	7	88	210
	74	12	81	180		85	7	95	270
	84	9	71	150		86	8	83	210
	88	11	64	150					
4	26	9	93	180	4	33	10	70	210
	81	11	31	150		64	6	58	210
	82	7	78	240		81	12	35	120
	84	9	71	150					
M	1	8	90	240	M	3	8	79	210
	25	7	97	270		43	10	79	180
	37	3	77	150		46	10	75	180
	46	8	76	150		51	6	95	210
	57	7	91	240		66	8	92	240
	65	3	91	180		73	7	80	180
						80	12	88	150

lower production. If he feels that the cows had everything in their favour, and, on a herd basis, should have done as well as the others but have not reached the production standard, he must cull them progressively from the herd. Watch also the month of calving—an analysis of herd recording information indicates that cows calving in the third quarter of the year are generally in the highest production ranges. The worst production period for most of the State is the first quarter.

You cannot afford to cull for culling's sake. By having a planned approach, as a cow is culled her place in the herd is taken by a selected replacement of a higher production potential. If a farm is overstocked, this would not apply because simply by culling the low producers and giving the high producers more to eat, there is an increase in production.

To see what a culling programme would look like refer to Table 1.

In this example, all things being equal, cows numbered 5, 8, 13, 17, 29, 31, 47, 54, 59, and 61 appear to be worthy of consideration for breeding replacement stock. Cows 19, 43, 68, and 85 could also be eligible for inclusion in this group. Cows numbered 22, 26, 27, 46, 74, 81, 82, and 88 appear to be ready for culling from the herd and replaced by the progeny of higher producing cows. Cows numbered 1 and 2 are an illustration of the need for caution. It could be that they had a difficult time at calving or could have been affected with mastitis at some stage of their lactation. These facts should be noted and allowances made when deciding whether to retain or dispose of cows.

In the final analysis your herd may look something like the example in Table 2.

TABLE 2

RANKING OF COWS

Top Bracket		Middle Bracket		Low Bracket	
Cow No.	Cow No.	Cow No.	Cow No.	Cow No.	Cow No.
5		1		22	
8	89	2		26	
13		3		27	
15		14		46	
17		41		74	
19		47		81	
29		50		82	
31		51		84	
47		55		88	
54		66			
59		73			
61		83			
68					

Remarks :—Cow No. 1. Decline in production—difficult calving.
Cow No. 2. Decline in production—effect of mastitis.
Cow No. 83. Replacement.

You are now in a position to retain progeny from your top-producing cows and gradually eliminate cows in the low production range. When this step has been completed, a fresh culling programme is drawn up but with higher butterfat levels.

Sheep On

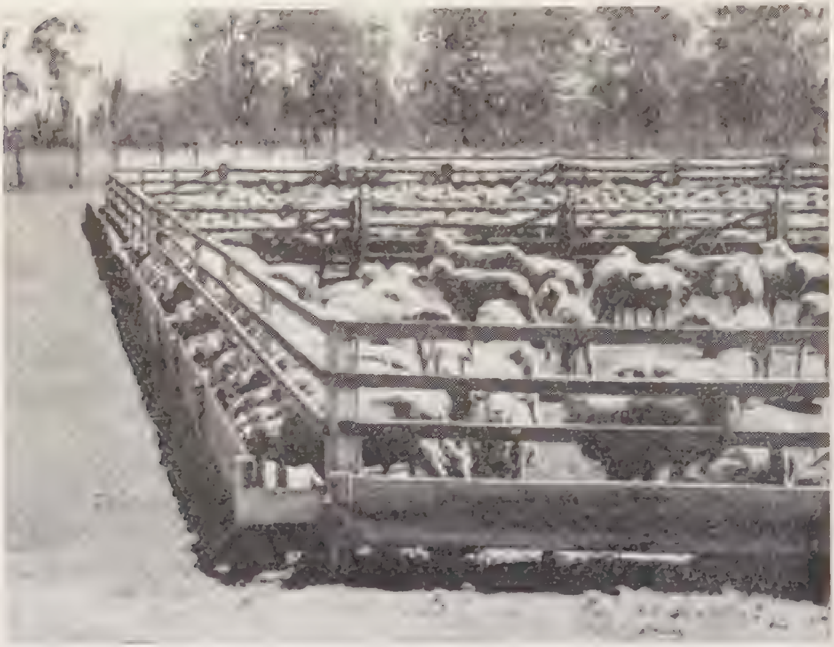

Plate 1: Intensive yard-feeding of wethers on a property near Bundaberg. Note the feed troughs outside the yard to prevent feed contamination.

Plate 2: Another more extensive view of the feeding yards.

The Coast

Plate 3: A good dog-netting gate and fence on the property. The gate is locked at top and bottom. Wild and stray dogs are one of the main problems in coastal sheep areas.

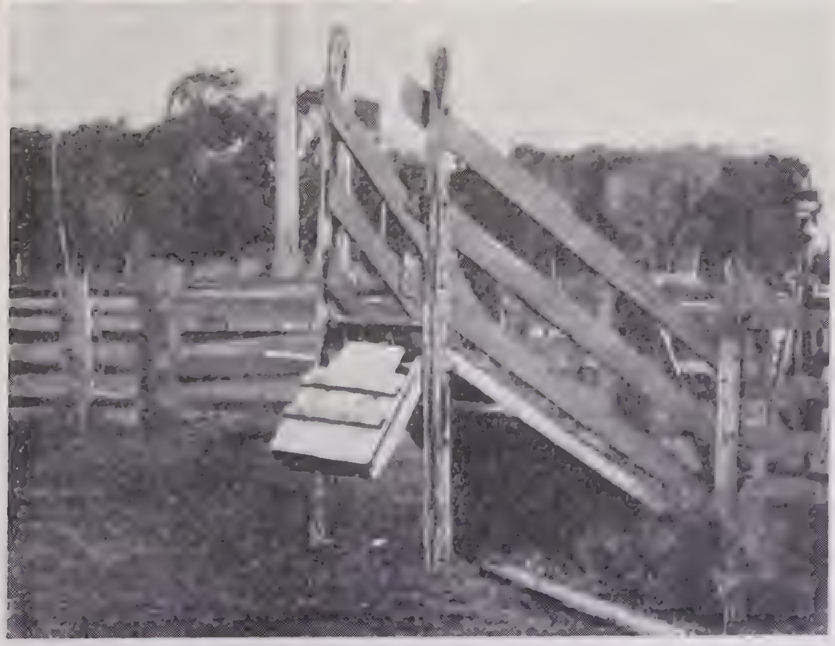

Plate 4: Loading ramp at sheep yards. Note adjustable apron to suit motor trucks of varying height.

Tuberculosis-Free Cattle Herds (As at 1st August, 1959)

Aberdeen Angus

Crothers, G. H. & H. J. "Moorenbah", Dirranbandi
Elliott, A. G., "Ooraine", Dirranbandi
Mayne, W. H. C., "Gibraltar", Texas

A.I.S.

Cox, T. L. & L. M. J., Seafield Farm, Wallumbilla
Crookey, J., Arolla A.I.S. Stud, Fairview, Allora
Davis, W. D. "Wamba", Chinchilla
Dennis, L. R., Diamondvale, A.I.S. Stud, Mundubbera
Edwards Bros. "Spring Valley", A.I.S. Stud, Kingaroy
Evans, E. G., Laurauen A.I.S. Stud, Maleny
Green, D. B., Deloraine, A.I.S. Stud, Durong, Proston
Heading, C. A., "Wilga Plains", Maleny
Henry, Mrs. K., Greenmount
Henschell, W., "Yarranvale", Yarranlea
H. M. State Farm, Numinbah
Littleton, H. V., "Wongalea", Hillview, Crow's Nest
Marquardt, A. C. & C. R., "Cedar Valley", Wondai
Mears, G. S. & E., M. S. 755, Toogoolawah
Moore, S. R., "Sunnyside", West Wooroolin
Neale, D. G., "Groveley", Greenmount
O'Sullivan, Con., "Navillus", Greenmount
Phillips J. & Sons, "Sunny View", Benair, Kingaroy
Power, M. F., "Barfield", Kapaldo
Queensland Agricultural High School & College, Lawes
Radel, R. R. & Sons, "Happy Valley", Coalstoun Lakes
Roche, C. K., Freestone, Warwick
Sanderson, W. H., "Sunlit Farm", Mulgildie
Schloss, C. J., "Shady Glen", Rocky Ck., Yarraman
Scott, M. E. & E., "Wattlebrae", A.I.S., Stud, Kingaroy
Scott, W. & A. G., "Wenlena", A.I.S. Stud, Blackbutt
Shelton, R. A. & N. K., "Vuegon" A.I.S. Stud, Hivesville, Murgon
Sokoll, A. H., "Sunny Crest", Wondai
Sperling, G., "Kooravale", Kooralgin, Cooyar
Sullivan Bros. "Valera", Pittsworth
Sullivan D., "Bantry", Rossvale, via Pittsworth
Sullivan, F. B., "Fermanagh", Pittsworth
Thompson, W. H. "Alfavale", Nanango
Webster, A. H., "Millievale", Derrymore, Helidon
Wieland, A. W., "Milhaven", A.I.S. Stud, Milford, via Boonah

Ayrshire

Dungeon, C. E. R., Marionville Ayrshire Stud, Landsborough
Dunn, T. F., "Alanbank", Gleneagle
Goodard, B., Inverell, Mt. Tyson, via Oakey
Holmes, L., "Benbecula", Yarranlea
Mathie, E. & Son, "Ainslie", Maleny
Scott, J. N. "Auchen Eden", Camp Mountain
Zerner, G. F. H., "Pineville", Pie Creek, Box 5, Post Office, Gympie

Friesian

Macdonald, S. E. G., "Freshfields", Marburg
Naumann, C. H., "Yarrabine", Yarraman
Pender, D. J., Lytton Road, Lindum

Guernsey

Doss, W. H., Degilbo, via Biggenden
Fletcher, A. B. "Cossart Vale", Boonah
Holmes, C. D. (owner Holmes L. L.) "Springview", Yarraman
Johnson, G. L. "Old Cannindah", Monto
Miller, G. "Armagh Guernsey Stud", Armagh, M.S. 428, Grantham
Ruge, A. & Sons, "Woonoonga", via Biggenden
Sanderson, N. H. "Glen Valley", Monto
Scott, C., "Coralgrae", Din Din Rd., Nanango
Swendson, A. C., Coolabunia, Box 26, Kingaroy
Wissemann, R. J., "Robnea", Headington Hill, Clifton

Jersey

Beckingham, C. Trout's Rd., Everton Park
Birt, W. C. M., Pine Hill Jersey Stud, Gundiah
Borchert, Mrs. I. L. M., "Willowbank" Jersey Stud, Kingaroy
Burrows, R. M., Wondai, Box 23
Bygrave, P. J. L., The Craigan Farm, Aspley
Carpenter, J. W., Flagstone Ck., Helidon
Conochie, W. S. & Sons, "Brookland", Sherwood Rd., Sherwood
Cramb, S. A., Bridge St., Wilsonton, via Toowoomba
Crawford, R. J., Inverlaw, Kingaroy
Farm Home For Boys, "Westbrook"
Fowler, P. & Sons, "Northlea", Coalstoun Lakes
Gregory, P. H. F., "Carlton", Rosevale, via Rosewood
Harley, G., "Hopewell", M.S. 189, Kingaroy
H. M. State Farm, Palen Creek
Hutton, D. R., "Bellgrath", Cunningham, via Warwick
Johnson, H. G., Windsor Jersey Stud, Beaudesert
Lau, J. F., "Rosallen", Goombungee, Toowoomba
Matthews, E. A., "Yarradale", Yarraman
McCarthy, J. S., "Glen Erin", Greenmount, Toowoomba
Meier, L. E., "Ardath Stud", Boonah
Noone, A. M. & L. J., "Winbirra", Mt. Esk Pocket
Porter, F., Conondale
Queensland Agricultural High School & College, Lawes
Ralph, G. H. "Ryecome", Ravensbourne
Scott, Est. J. A., "Kiaora", Manumbar Rd., Nanango
Semgreen, A. L., "Tecoma", Coolabunia
Seymour, B. T., "Upwell", Jersey Stud, Mulgeldie
Smith, J. A. & E. E., "Heatherlea", Jersey Stud, Chinchilla
Tatnell, W. T., Cedar Pocket, via Gympie
Toowoomba Mental Hospital, Willowburn
Verrall, F. W., "Coleburn", Walloon
Weldon Brothers, "Gleneden", Jersey Stud, Upper Yarraman

Poll Hereford

Anderson, J. H. & Sons, "Inverary", Yandilla
Hutton, D. R. & M. E., "Bellgrath", Cunningham, via Warwick
McCamley, E. W. G., "Eulogie Park", Dululu
Maller, W., "Bore View", Pickanjinnie
Wilson & McDouall, Calliope Station, Calliope

Poll Shorthorn

Leonard, W. & Sons, Welltown, Goondiwindi

Judging the Ages of Cattle By Their Teeth—New Data

By M. A. BURNS,
Senior Adviser in Cattle Husbandry.

Examination of the incisor teeth is the method commonly used for assessing the age of cattle up to four years. While it is shown to be a fairly reliable guide to the average age of large groups of cattle, it may be misleading when used as a guide to the age of individual animals.

Observations on the time of eruption of permanent incisor teeth of both male and female beef cattle have been carried out at the "Brian Pastures" Research Station *over a period of 3½ years from November, 1954 to May, 1958.

In the case of about 70 per cent. of the animals, variation in the age at which eruption of a pair of incisor teeth occurred was less than three months. Some animals had four teeth before others had two, and this overlapping happened at other ages also.

For females, 79 per cent. of the group erupted the first pair of permanent incisor teeth between the ages of 24 and 26 months. The second pair of teeth erupted between 31 and 34 months of age—again for 79 per cent. of the group. The third pair erupted between 39 and 42 months of age for 57 per cent. of the group. Eruption of the third pair had not occurred at 42 months for 36 per cent. of the group.

For males, 71 per cent. of the group erupted the first pair between 24 and 26 months of age but the average was 1.1 months less than for females. The second pair of teeth in males erupted between 29 and 31 months in 67 per cent. of the group. For the third pair, 71 per cent. of the group erupted teeth between the ages of 36 and 40 months.

The average interval between eruption of successive pairs ranges from 5.6 to 7.4 months.

Management of Animals

All animals were the progeny of grade Hereford cows and stud Poll Hereford bulls. Birth dates of the observed animals were in the months of November and December, 1954. Weaning took place in August, 1955. Males were castrated at four to six months. Females were mated about 27 months and calved accordingly at three years.

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* This station was purchased as a research station in 1952 by the Australian Meat Board. Observations on the eruption of incisor teeth were carried out at the request of the United Graziers' Association of Queensland to provide evidence on the reliability of dentition of beef cattle as an indication of age.

Nutrition

During the course of this study the stock were run under open grazing conditions on native pastures growing on the basaltic and granitic soils of the Central Burnett district. Blue grass (species of *Dichanthium* and *Bothriochloa*) and spear grasses (species of *Stipa Heteropogon* and *Aristida*) dominated the pasture. They produce a heavy growth of material during the first quarter of the year and dry off rapidly following seeding. Such pastures are inadequate to maintain continuous growth rates throughout the year.

During August and September, 1957, the pregnant females in the observed group received a supplement of blood meal and molasses. With this exception there was no feeding of mineral supplements or concentrates. The weight gains followed the typical growth pattern for the district, namely, high gains during late summer followed by loss of weight in winter and steady weight gain during spring and early summer. The rate of growth during spring and early summer in 1957 was depressed by drought.

TABLE 1

AGES AND RANGE AT TIME OF ERUPTION OF PERMANENT INCISORS

——	Average Age in Months	Range in Month
(*a*) Males—		
1st pair (21 head) . .	24·9	22–27
2nd pair (21 head) . .	30·5	27–34
3rd pair (20 head) . .	37·9	33–41 (one not erupted.)
4th pair	one animal only at 41 months	
(*b*) Females—		
1st pair (14 head) . .	26·0	22–34
2nd pair	33·4	29–41
3rd pair	. .	35–42 (+ five not erupted)
4th pair	One animal only at 41 months.	

TABLE 2

AVERAGE INTERVAL BETWEEN ERUPTION OF PAIRS OF TEETH

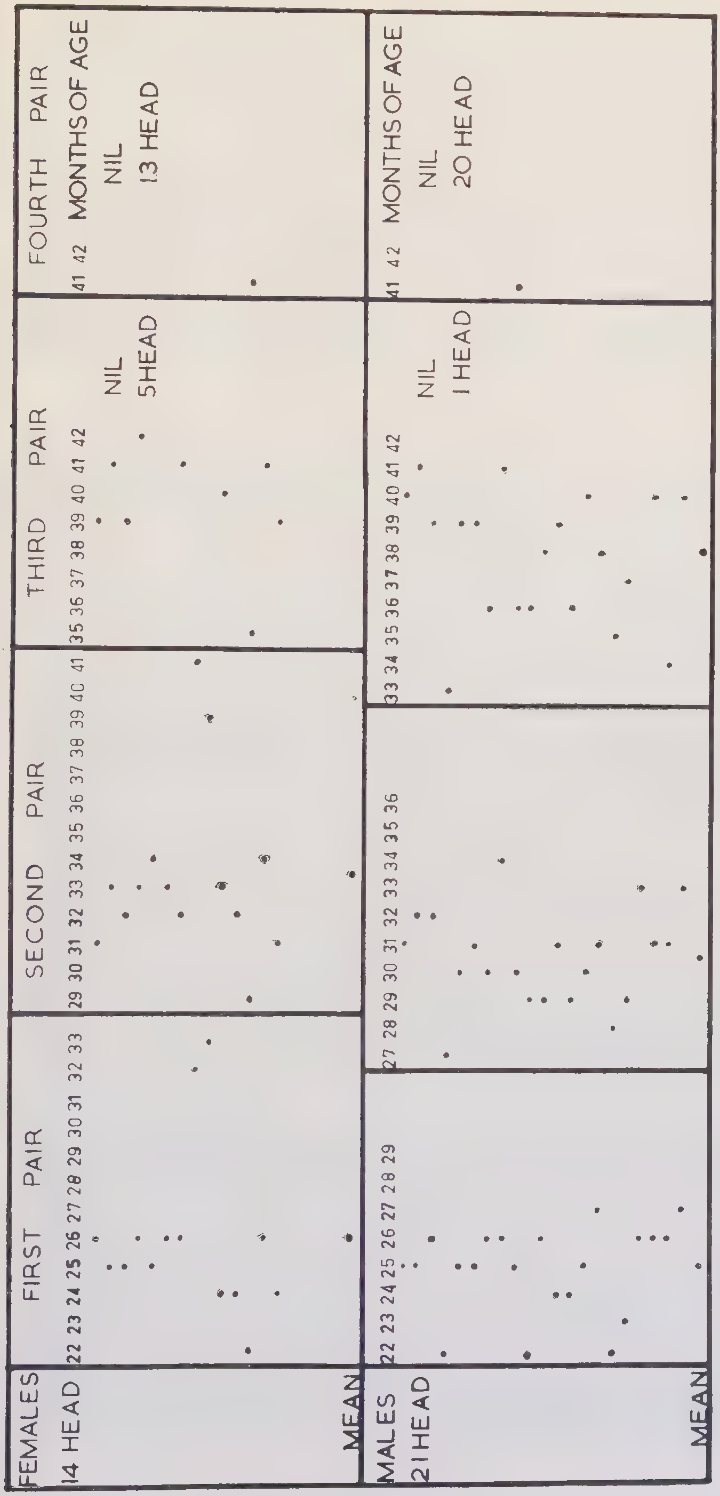
——	1st–2nd Pairs	2nd–3rd Pairs
Males	5·6 months	7·4 months (one animal excluded)
Females	7·4 months	

TABLE 3

AVERAGE BODYWEIGHTS OF ANIMALS AT TIMES OF ERUPTION

(*a*) Males . .	1st pair (Jan., 1957) 709 lb.	2nd pair (July, 1957) 691 lb.	3rd pair (March, 1958) 859 lb.
(*b*) Females . .	1st pair (Feb., 1957) 687 lb.	2nd pair (Sept., 1957) 700 lb.	

* This weight was influenced by advancing pregnancy and supplementary feeding.



AGE OF ANIMALS AT ERUPTION OF PERMANENT INCISOR TEETH

GRADE HEREFORDS "BRIAN-PASTURES" GAYNDAH 1958

Plate 1

Age of Grade Herefords at Eruption of Permanent Incisor Teeth.

Method and Results

The number of temporary incisor teeth visible at birth was observed in 136 calves of both sexes during November-December, 1954. Random groups of both males and females were then taken for the purpose of monthly observations. These began in February, 1955, and continued until the sale of the majority of the groups when an age of 42 months had been reached. Some wastage occurred from the original groups and the data which are presented have been obtained from 21 males and 14 females which were under observation throughout the whole period.

Eruption time is taken as the time when the edge of the tooth becomes visible through the gum. As a point of interest the majority of calves showed six temporary incisors at birth with a range of from two to eight.

Plate 1 shows the age distribution of animals as at successive times of eruption.

The average age for males at the time of eruption of the central pair of permanent incisors was 24.9 months. This was about one month younger than females at 26 months.

The average interval between eruption of the first and second pairs in males was 5.6 months followed by an interval of 7.4 months between second and third pairs.

In only two of the 35 animals the fourth pair of teeth had erupted at the conclusion of the observations. The animals were then 42 months of age.

There was no general pattern in the number of temporary teeth shed at one time. In some cases all temporary teeth were shed prior to the

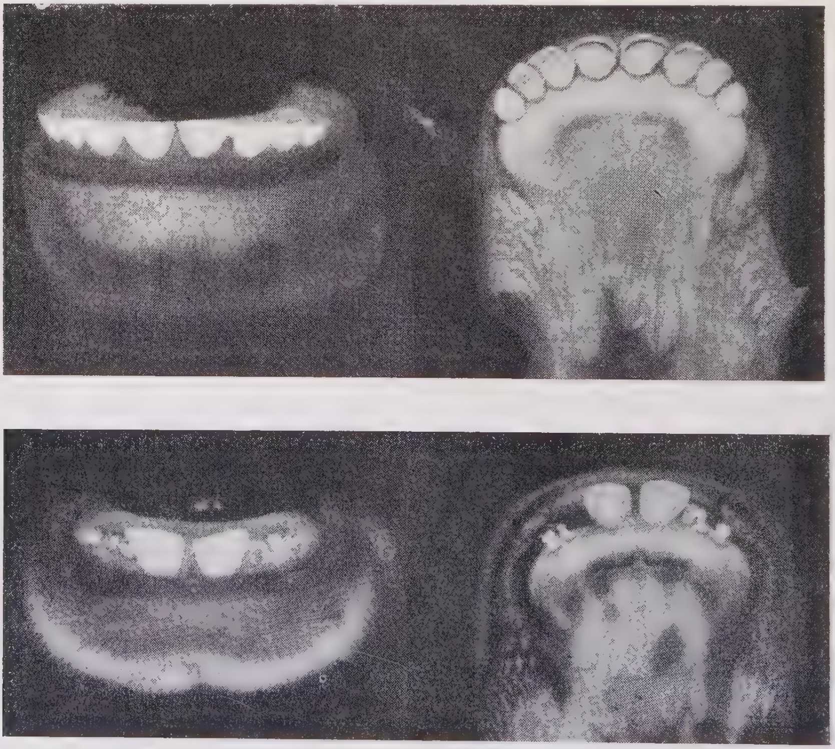


Plate 2

Incisor Teeth of Cattle, Showing Front and Inside Views. Top Row : Full set of temporary teeth. Second Row : First pair of permanents, also showing stubs of remaining temporaries.

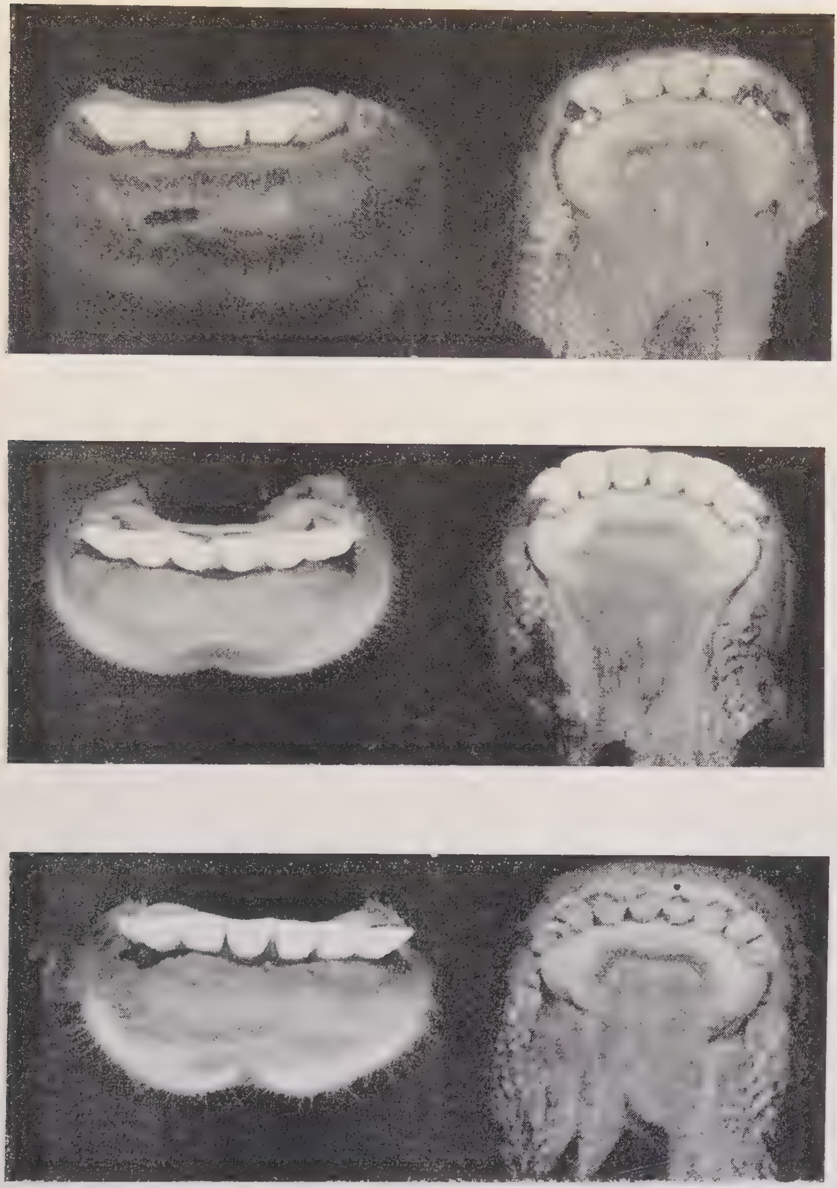


Plate 2 (continued)

Third Row : Second pair of permanents. Fourth Row : Third pair of permanents. Fifth Row : Full set of permanents.

appearance of any permanent teeth, but other animals retained some temporary teeth even when two pairs of permanent teeth were fully out of the gum. Shielding of the temporary teeth always began with the central pair.

Data were not obtained on the eruption times of molar teeth owing to the difficulties encountered in making accurate observations.

The fluctuating plane of nutrition probably delayed eruption time, particularly as the animals became older (D. M. Joubert).

The results obtained are comparable with reports from overseas as shown in Table.

—	1st–2nd Pair	2nd–3rd Pair
	Months	Months
"Brian Pastures"—		
Females	7·4	7·6
Males	5·6	7·4
Joubert—Females	6·3	6·5
Wiener and Donald—		
Females	6·4	5·5
Bonsma and Neser (mixed sexes)	7	6

TABLE 4

Females	1st Pair		2nd Pair		3rd Pair	
	Average and Range in Months		Average and Range in Months		Average and Range in Months	
"Brian Pastures"—						
Females	26	22–34	33·4	29–41	41 }	35–42 }
Males	24·9	22–7	30·5	27–34	37·9	33–41
South Africa—						
Females	24·4	19–32·6	30·7	24–40·7	37·2	32–42·2
Scotland—Females	23	18–30	29·5	25·4–33·8	35	24·8–43·6
South Africa—(mixed sexes of animals)	27	24–29	34	28–39	40	34–45

The time of eruption of permanent incisor teeth falls within a range of 2–3 months for about 70 per cent. of animals. However, an extreme range of up to 12 months is reported and overlapping (for example, the appearance of four teeth in one animal before another in the same group has two) has occurred at all stages within comparative groups of animals. It is thus concluded that the state of dentition, taken alone, is not a reliable guide to the age of cattle.

* * *

Keep Piglets Warm

Young pigs should be protected from cold, westerly winds and not be forced to lie on cold, damp floors. Cold, damp conditions frequently bring on a number of diseases which can result in slow growth or even death—*T. ABELL, Senior Adviser, Pig Branch.*

Stock and Station

Blowfly And Worm. Field officers who noted the considerable blowfly activity in sheep areas this season stress that, provided special care has been used in its application, the insecticide, diazinon, has given favourable results.

To quote one field officer, "Diazinon is only giving good results where applied strong, at 0·04 per cent. concentration, and at ½ gal. per sheep, jetted to the skin, for body and crutch strike, especially with half-woolled sheep."

This season has also favoured worm increases. The Sheep and Wool Branch recommends the practice of drawing ration sheep direct from paddock flocks. This enables worm post mortem examinations on ration sheep to be used to indicate the severity of worm burdens in paddock flocks. If action is delayed until outward symptions of worms are obviously visible in flock sheep, the position becomes one (as it too often does) of "panic drenching" instead of wise preventive control.—*R. B. YOUNG, Senior Adviser, Sheep and Wool.*

Phosphorus Deficiency in Cattle. Give your cattle a phosphorus-rich supplement this winter and avoid loss of production and unthriftiness through phosphorus deficiency.

Phosphorus deficiency causes a great deal of wastage in both the beef and dairy industries. Reports of the condition are received every winter.

Phosphorus-rich supplements in the ration will correct the deficiency or, if fed now, will prevent it during the winter. Phosphorus supplements can be supplied either as licks or as concentrate added to the drinking water. Licks can be used everywhere, but they're rather wasteful and not all stock will take to them. However, bonemeal can be given successfully to dairy cows fed in the bails. Where cattle water at troughs, phosphate can be supplied in the drinking water by means of an automatic dispenser.—*K. M. GRANT, Assistant Director of Veterinary Services.*

Best Cattle for Tropics. Breeding cattle that will be better adapted to our conditions is one of the most important avenues for the improvement of the cattle industry in Queensland.

Considerable experimental data have already been accumulated in Queensland and in other countries which indicate that crossbreeds between Brahman and British cattle will gain faster than British breeds under range conditions in tropical and subtropical climates. Furthermore the greater growth rate is reflected in greater carcass weight at a given age.

There are three possible methods of approaching the problem of breeding cattle that may be more suitable to our particular climate:

1. Intensive selection within the British breeds for those animals that are best adapted to our environment;
2. Crossbreeding between Brahman and British breeds and the interbreeding of selected crossbreds to develop new breeds; and
3. Continued crossbreeding without endeavouring to form new breeds.

Steady progress in breeding better cattle for our conditions can be expected by any of the three methods, provided sound methods of selection are used.—*J. G. YOUNG, Senior Husbandry Officer.*

Antibiotics for Pigs. Incorrect use of antibiotics in rations for pigs can be both disappointing and expensive. Antibiotics are fed to pigs to control diseases and to speed up growth.

Best time to start growth stimulation is when you commence creep feeding. Piglets are susceptible to digestive disorders and some of the antibiotics are very useful in preventing scours. There's evidence to show that once you've started pigs on a growth stimulant, you should keep them on it or the growth rate may slow down when the antibiotic is left out of the feed. If the amount of antibiotic is reduced after the pigs reach 100 lb., the pronounced reduction in growth does not occur.

Antibiotics can be valuable allies in your attempts to increase financial returns, but they can never be substitutes for good housing, feeding and management.—*T. ABELL, Senior Adviser, Pig Branch.*

Damp Meal for Sows. A recent Agriculture Department trial has shown that it is worthwhile feeding damp meal to sows. These animals are usually hand-fed, not self-fed. The feeding test indicated that wet feeding reduces food wastage.

In feeding the sows, water was first poured into a trough and meal was dropped in on top of it. The sows quickly mixed the two while feeding. It was found that half a pint of water to a pound of dry meal gave a satisfactory damp mixture.

Damp feeding not only reduced wastage. It was also found that sows fed damp meal were willing to eat more food, and this is an important point when sows are sucklings litters or when pigs have poor appetities.—*J. A. CHRISTENSEN, Adviser, Pig Branch.*

Timely Tips for September

It's not too late yet to get some benefit from "strategic" dipping for ticks if you start straight away—and do it right.

On the subject of dipping, make yourself a promise (and keep it) to look after the dip well this year. Keep a dip book, make periodic checks on the strength of the fluid (the Department will do this free of charge) and charge it carefully according to the dip manufacturer's instructions. You'll get a better "kill" if you look after your dip well.

September may see the beginning of spring. Blight may come with it, to affect cattle, sheep or horses. Watch for tears, red lids, blinking, painful eyes (especially when the sun shines in them). Treatment at this stage with modern drugs give really good results. Your vet. will give you details of what gives best results in your district.

Don't let those eyes go beyond that early stage. If you do you'll see the clear part of the eye go cloudy, blood vessels grow into it and fleshy inflammation develop. The eyes may point and even burst. *Don't let it get to this stage.* Blindness may result, and treatment is not nearly so efficient then.

Tick fever may crop up at this time of the year. Generally it follows the "spring rise" of ticks. Remember it can be cured by an injection, but that there are a lot of other points to be considered. Talk it over with your Veterinary Officer.

Capon Heads Upset Growing Pigs

By P. D. RANBY, Veterinary Officer.

Young pigs fed capon heads that carried the remains of hormone pellets were found to be unthrifty and very uneven in size.

With the expansion of the table poultry trade, large numbers of "chemical" capons have been coming onto the market. To produce the chemical capon, a hormone pellet is implanted under the skin of the top part of the bird's neck sometime before slaughter. The hormone is an oestrogen which has the effect of "effeminizing" the cockerels and improving the quality of their flesh. At slaughter, the remains of the hormone pellet are discarded with the head and neck.

When such capon heads together with other poultry offal are fed to pigs as a "soup", boiling does not

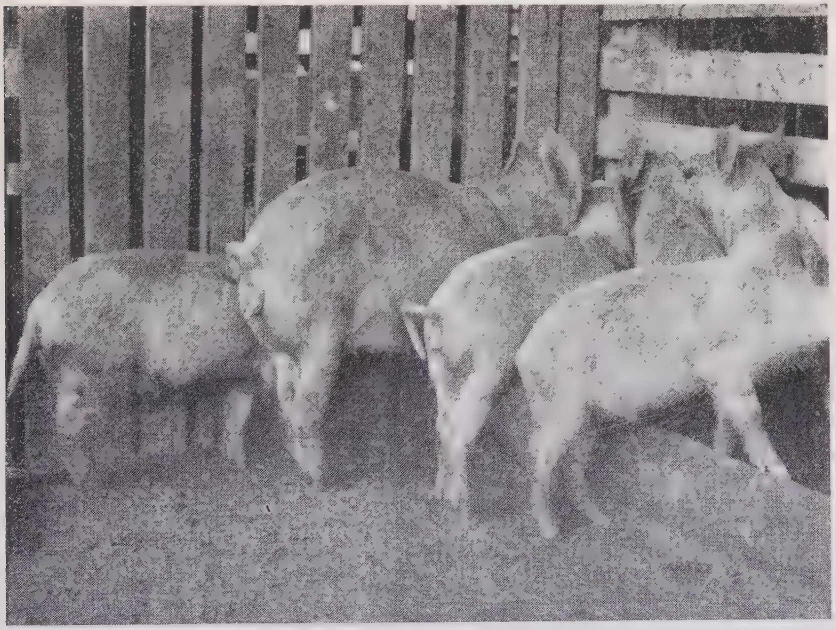


Plate 1

These 2-2½ Months Old Pigs were being Fed Capon heads as a "Soup". They were showing various signs of poisoning from the hormone residues. Note the uneveness in size.

destroy the hormone residue from the remains of the pellets.

On one piggery in the Brisbane area, 30 growing pigs were fed soup prepared from capon heads and offal with adverse effects. Adult pigs on the same property which were not fed the soup were found to be thriving.

Oestrogen Poisoning

The growing pigs were generally unthrifty and very uneven in size although about the same age (See Plate 1). Various signs of oestrogen poisoning were present. The young female pigs were showing intense signs of heat and other sexual activity long before their due time.

The young pigs had been fed capon heads in soup over six weeks. On checking on the poultry abattoir, it was found that the hormone implants were used at the rate of 15 milligrams per capon.

On withdrawing the capon heads from the pigs' diet, symptoms practically disappeared in a week while growth and general condition improved.

In the case of feeding capon heads to pregnant sows, there would be a danger of abortion and prolapse.

Milking Capacity of Sows

When farmers select a breeding sow they usually consider type and prolificacy, but her capacity to produce milk is often overlooked.

Fast litter growth is dependent on the sow's milk production in the first few weeks after farrowing.

The actual amount of milk produced by sows in a lactation has been measured, and varies from 300 to 650 lb. in the 8 weeks. Production varies from day to day, and from one milk gland to another, but the general pattern is an increase in the weekly yield up to the fourth week, then a decrease until weaning.

Piglets are only able to take from one-third to one-half of the milk in a sow's milk glands each time they suckle. If their dam is a poor milker then they cannot grow rapidly because they get insufficient food. This is one reason why you should try to select breeding sows from strains known to be good milkers, measured by the production of heavy 3-weeks-old piglets.

The quantity and quality of the food you give a sow affect her milk yield. To get maximum production you must feed her enough of the right types. Insufficient food means lowered milk yield and loss of body weight. Sow's milk goes through two major changes in composition. The first is a rapid change from colostrum to normal milk in the first week after farrowing. Then a gradual change takes place in the percentage of the various constituents, and the critical period is about the third week of lactation, just before the maximum yield is reached.

Creep feeding of the litter should be established by this time, because from this stage on you will get more weight increase in the piglets per pound of food if it is fed directly to them rather than to the sow, which has first to convert the food to milk.

If you want fast growing litters you now know why you must select sows which can milk well, feed them properly, and have the litters eating a good creep feed mixture before they are 3 weeks old. —*T. ABELL, Senior Adviser, Pig Branch.*

Lindane For Sheep Nasal Bot

By C. R. SMITH and R. B. YOUNG,
Senior Advisers, Sheep and Wool.

Experiments have shown that lindane is effective in destroying sheep nasal fly larvae in the heads of sheep.

ALTHOUGH the sheep nasal fly is common in sheep areas of Australia, it is not a major economic pest. Its activities cause loss of condition in some flocks. It can be a cause of concern to studmasters who obviously would not want to present sheep at shows or offer rams for sale showing nasal discharge caused by bot infestation.

The sheep nasal bot is the larval form of the sheep nasal fly (*Oestrus ovis*).

Sheep with running noses (so called "snotty nose") in the flock are often the first intimation the sheepman has that the nasal fly has been at work. The background experience of the sheepman is able to tell him that "snotty nose" is caused by the presence of maggots, sometimes as big as an inch in length, hidden deep in the nasal clefts and sinuses of his sheep.

He has occasionally seen these white-bodied, black-banded grubs

Plate 1

Sheep on the Darling Downs Suffering from Nasal Bot.

in cavities of the skulls of ration sheep that have been split open to obtain the brains.

But very few sheepmen have seen the nasal fly that commences the circle of activity which results in the presence of these large white grubs in the sheep's skull. This is probably because the flies are small and quick flying, and not at all an obvious pest.

However, the sheep are well aware of their presence long before the sheepman, for once flies of this type are about during spring and summer, sheep show very obvious irritation. They become restless, rush about, mob together, and endeavour to hide their noses from the attack of the flies by periodically shaking their heads, or thrusting their noses into the wool of other sheep or into the dust beneath them.

If the sheepman chances to be in the paddock at a time when such restlessness is evident, careful observation may help him to observe the flies themselves.

Flies Hatch in Warm Months

The sheep nasal fly is a "nuggety", dark-grey fly slightly smaller than a blowfly. It is profusely spotted with small black spots in the thoracic region.

These flies hatch from below soil level in spring and summer and mate soon after hatching.

In early morning and evening they remain resting in warm sunny spots on various objects such as trees, timber, and tall grass in the vicinity of sheep camps. As the day becomes hotter they commence flight in search of sheep.

They become intensely active, flying and hovering amongst the sheep, and pounce swiftly to lay tiny larvae or maggots on the nostrils of the sheep. During the life of about four weeks, the female fly can infest many sheep with these minute larvae.

Soon after being deposited near or on the sheep's nostrils, the larvae crawl upwards into the passages and sinuses of the nose and skull.

In lambs, growth of the larvae may be complete within a month; in older sheep this may take nine or 10 weeks.

By this time the larvae are of considerable size, and may be over an inch long. They are white and plump, with a black-banded back, and on the lower surface of the body are rows of small spines.

Larvae may be Sneezed Out

At maturity the larvae leave the nostrils, often being sneezed out, and, once on the ground, burrow into the soil.

In instances where the larvae have originally entered through very small openings, they outgrow the dimensions of the entrance, and being unable to emerge, they die in the skull cavities in which they developed.

Pupae Live Underground

Those larvae that managed to emerge or were forcibly expelled by sneezing of the sheep soon burrow underground. They shrink, harden, and pupate.

Pupation may last one to three months.

Following pupation the adult fly emerges, dries its wings, and flies in search of a mate.

Effect on Sheep

The harmful effect of the nasal fly on the sheep is twofold. The flies attacking the sheep interfere with grazing and resting, and cause unthriftiness. The larvae in the nasal cavities irritate the delicate mucous membranes which become swollen and inflamed. A copious nasal discharge of foul mucus passes down the nostrils, hindering breathing. Irritation causing hindrance to feeding and resting occurs, and sheep lose condition. There is much sneezing and snuffling.

Because of the damage to the mucous membranes, secondary bacterial invasions can result, in rare instances sufficient to cause death.

Control With Lindane

Until recently, control measures seldom showed satisfactory results. These methods included smearing the nostrils with pine tar, providing salt lick troughs with the margins copiously smeared with tar, and applications through the nostrils of carbon bisulphide and paraffin, or tetrachlorethylene and paraffin.

Then South African scientists at Onderstepoort Laboratory explored a new method of treatment with nasal injections of chlorinated hydrocarbons. In field observations they had observed that mature larvae of nasal bot could exist in lambs only a month old. This indicated that infestation could occur shortly after birth, and larval development could be completed within a month.

Their experiments showed that lindane was effective in destroying the larvae in the heads of sheep. They investigated concentrations of lindane that could be tolerated.

In addition they sought to discover a form in which the insecticide could be introduced in order to ensure maximum penetration into the almost inaccessible situations into which the larvae find their way.

It was necessary for the emulsions to be able to side-pass the almost solid mucoid accumulations with which the sinuses are often clogged.

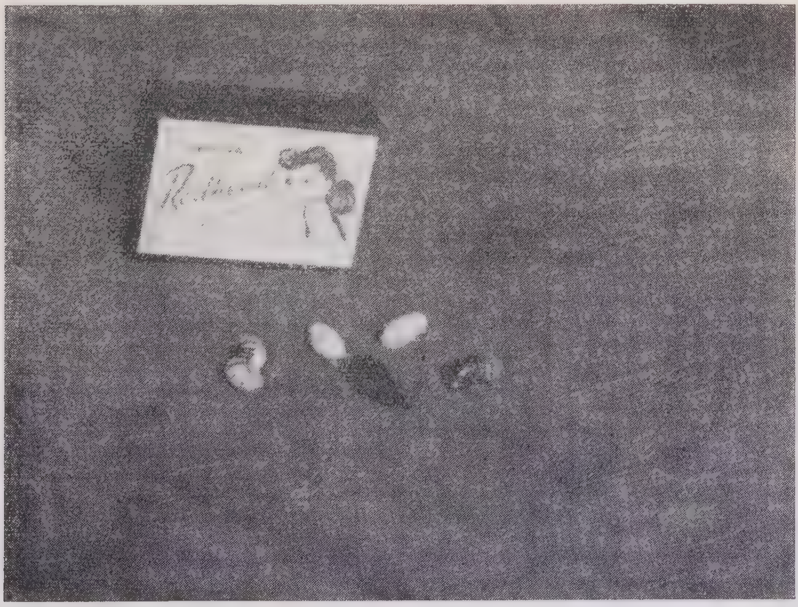


Plate 2

Nasal Bot Larvae Taken from the Sinuses of an Affected Sheep's Skull.
A match box is shown for size comparison.

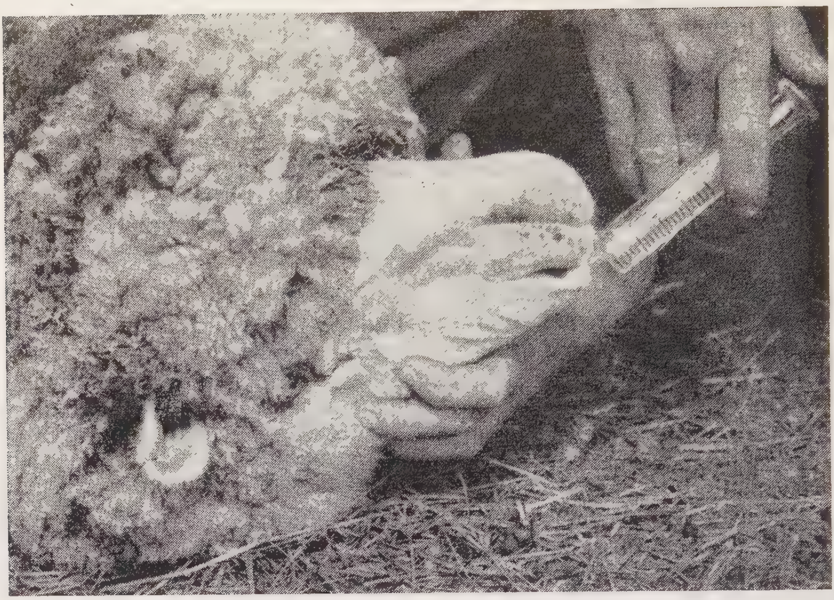


Plate 3

Using Lindane Treatment for Nasal Bot. Note that the sheep's head is held at an angle of 45 degrees with the ground.

The formula arrived at was—

	Parts by Volume.
SOLVENTS	
Benzol	**12.5**
Acetone	**12.5**
Kerosene (lighting) . .	**10.0**
EMULSIFICANTS	
Sulphonated castor oil . .	**57.0**
A wetting agent . .	**2.0**
ACCESSORY SOLVENT	
Oleic acid (technical) . .	**6.0**
	100.0

LINDANE — 4 gm. per 100 c.c.

Four c.c. of this mixture were injected into each nostril of a sheep lying on its back, with head held at an angle of 45 degrees with the ground. The sheep was held 10 seconds after injection to assist penetration. In the experiments a dosage in excess of 20 mg. of the formula per kg. of body weight was found to cause some loss in lambs, and mismothering. It was, therefore, recommended that lambs under 20 lb. live weight should not be treated.

Dose rates of the formula recommended are:—

Lamb
20 lb.—½ c.c. each nostril.
Weaner
30 lb.—1 c.c. each nostril.
Weaner
40 lb.—1½ c.c. each nostril.
Sheep
50 lb.—1½ c.c. each nostril.
Sheep
60 lb. to 100 lb.—2 c.c. each nostril.
Sheep
100 lb. and over—4 c.c. each nostril.

The South African scientists recommended that the treatments be repeated at three weekly intervals.

Queensland Field Trial

The South African formula was used in treatment of a number of sheep affected in the early part of 1958 in the Darling Downs area of Queensland. Nasal fly was very prevalent in some flocks in that area in January, 1958. A state of semi-drought made paddocks and cultivation areas almost devoid of pasture and gave sheep little protection from attacks by nasal fly. British breed and crossbred sheep and lambs lost condition because of the running around and the clogging of their nasal passages.

Two hundred and seventy-seven affected sheep from five properties were treated, there being 72 Dorset Horn rams, 135 Dorset Horn ewes, 50 Crossbred ewes, and 20 Crossbred lambs.

Method of Administration

Four c.c. of the formula were squirted into each nostril by means of an automatic syringe with the needle removed. The sheep were held for 10 seconds after treatment. The first sheep were treated by holding them on their backs. Later a Reid South Australian Mulesing cradle was used. With the cradle there was less struggling, and less contamination of the operator with mucus expelled by the sheep.

The sheep's head was held at an angle of 45 degrees from horizontal.

There was little untoward reaction. A few sheep held their heads high on being released, and tended to walk backwards for a few steps. There was some dizziness, but recovery was rapid.

With the majority, only one treatment was found to be necessary. Three weeks after treatment, 75 per cent. were reported to have shown a remarkable recovery; 24 per cent. were considerably eased in their breathing, and 1 per cent. was drafted off for re-treatment.

The Paralysis Tick

August usually sees the scrub tick or paralysis tick on the increase all along the eastern Australian coast.

Right up till March this deadly parasite is capable of causing paralysis and death in any of the mammalian species. Dogs are most commonly affected.

Early signs seen are, refusal to eat, vomiting, and a swaying motion in the hind limbs which soon progresses to complete paralysis. The dog goes down and death rapidly follows from respiratory failure due to the tick's poison.

Treatment is effective if the dog is given anti-tick serum by a veterinary surgeon as soon as the swaying in the hind limbs is seen. Speed here is essential—2 or 3 hours' delay can be fatal.

Control of the paralysis tick is best attained by use of a BHC wash or powder every 7 days. In bad areas, the only safe method is a thorough daily search of your dog.—*E. R. JOHNSON, Veterinary Officer.*

Brucellosis-Tested Swine Herds (As at 1st August, 1959)

Berkshire

Astbury, "Rangvilla", Pechey
Clarke, E. J., Mt. Alford, via Boonah
Cochrane, S., "Stanroy", Felton
Cook, F. R. J., Middle Creek, Pomona
Crawley, R. A., Rockthorpe, Linthorpe
Edwards, C. E., "Spring Valley" Stud, Kingaroy
Farm Home For Boys, Westbrook
Fletcher, A. C., "Myola" Stud, Jimbour
French, A., "Wilson Park", Pittsworth
Grayson, D. G., Killarney
H. M. State Farm, Numinbah
H. M. State Farm, "Palen" Stud, Palen Creek
Handley, J. L., "Meadow Vale", Lockyer
James, I. M. (Mrs.) "Kenmore" Stud, Cambooya
Kimber, E. R., Block 11, Mundubbera
Law, D. T., "Rossvill" Stud, Aspley
Lees, J. C., "Bridge View" Stud, Yandina
Ludwig & Sons, A. R., "Beau View" Stud, Beaudesert
McLennan, G. J., "Murcott" Stud, Willowvale
O'Brien & Hichey, J., "Kildurham" Stud, Jandowae East
Orange, L. P., "Hillview", Flagstone Creek
Pfrunder, P. L., Pozieres
Pick, L., Mulgildie
Potter, A. J., "Woodlands", Inglewood
Puschmann, L., "Tayfield" Stud, Taylor
Q.A.H.S. & College, Lawes
Regional Experiment Station, Hermitage
Rosenberger, N., "Nevrose", Wyreema
Schellback, B. A., "Redvilla" Stud, Kingaroy
Smythe, E. F., "Grandmere" Stud, Manyung, Murgon
Stark, H. L., "Florinda" Stud, Kalbar
Thomas & Sons, F., "Rosevale" Stud, Laravale
Traves, G., "Wynwood" Stud, Oakey
Weier, V. F., "La Crescent", Clifton
Wolski, A., "Carramana", Warra
Young (Jnr)., W., Kybong, via Gympie

Large White

Assenbruck, C., Mundubbera
Barron Bros., "Chiltern Hill", Cooyar
Bell & Son, E. J., "Dorne", Chinchilla
Butcher, Dr. B. J. & Parnwell (Mrs.), Plunkett, via Tamborine
Clark, L. D., Greens Creek, Gympie
Duncan, C. P., "Hillview", Flagstone Creek
Fowler, S., "Kenstan", Pittsworth
Franke, H. J., "Delvue" Stud, Cawdor
Garrawin Stud Farm Pty. Ltd., 657 Sandgate Rd., Clayfield
Gibbons, A. E. H., Mt. Glorious
Gibson, H., "Thistleton" Stud, Maleny
H. M. State Farm, Numinbah
Hall, M., "Milena" Stud, D'Aguilar
Heading, J. A., "Highfields", Murgon
Horton, C. J., "Mannuem Brae" Stud, Mannuem, Kingaroy
Hutton, G., "Grajea" Stud, Cabarlah
Jensen, S., Rosevale, via Rosewood
Jones, K. B., "Cefn" Stud, Clifton
Kahler, J. & S., East Nanango
Kanowski, A., "Exton", Pechey
Kennard, R. B., "Collar" Stud, Warwick
Larsen, H. L., "Oakway" Stud, Kingaroy
Law, D. T., "Rossvill" Stud, Aspley
Lees, J. C., "Bridge View", Yandina
Lobegeiger, L. C., "Bremer Valley" Stud, Moorang, via Rosewood
Mack, A. J., Mundubbera
Palmer, A., "Remlap", Greenmount
Pampling, G., Watch Box Road, Goomeri
Postle, R., "Yaralla" Stud, Pittsworth
Powell, R. S., "Kybong", Gympie
Q.A.H.S. & College, Lawes
Radel, V. V., Coalstoun Lakes
Regional Experiment Station, Biloela
Robinson, O. R., & O. J., "Linvale", Argoon, Biloela
Skyring, G. I., "Bellwood" Stud, via Goomeri
Stanton, H. R., "Tansey" Stud, via Goomeri
Stewart, L., Mulgowie, via Laidley
Stumer, K. F., French's Creek, Boonah
Wharton, C. A., "Central Burnett" Stud, Gayndah
Wieland, L. C. & E., Lower Cressbrook, Toogoolawah
Zahnow, W., Rosevale, via Rosewood

Tamworth

Armstrong, H. J., "Alhambra", Crownthorpe, Murgon
Booth, J. D., Swan Creek, Warwick
Campbell, P. V., "Lawnhill" Stud, Lamington
Coller, R. H., Tallegalla, via Rosewood
Fletcher, A. C., "Myola" Stud, Jimbour
Herbst, L. "Hillbanside", Bahr Scrub, Beenleigh
Kajewski, W., "Glenroy" Stud, Glencoe
Kanowski, S. E., "Miecho", Pinelands
Potter, N. R., "Actonvale" Stud, Willcamp
Regional Experiment Station, Kairi
Salvation Army Training Home For Boys, "Canaan" Stud, Riverview
Skerman, D. F. L., "Waverley", Kaimkillenbun
Stephens, T., "Withcott" Stud, Helidon
Thomas & Sons, F., "Rosevale" Stud, Laravale
Wieland, L. C. & E., Lower Cressbrook, Toogoolawah

Wessex Saddleback

Ashwell, J., "Green Hill", Felton South
Burnett, G. C., "Rathburnie" Stud, Linville
Cooper, G. J., Neumgua
Douglas, W., "Greylight" Stud, Goombungee
Dunlop, J. B., "Kunawyn", Acacia Road, Kuraby
Kruger & Sons, "Greyhurst" Stud, Goombungee
Law, D. T., "Rossvill" Stud, Aspley
Mack, A. J., Mundubbera
Scott, A., Wanstead Stud, Grantham
Smith, C. R., "Belton Park", Nara
"Wattledale" Stud, 432 Beenleigh Road, Sunnybank

Large Black

Pointon E., Goomburra

Orchard and Garden

Guard Against Soil Acidity. Farmers who grow fruit or small crops on Queensland's coastal soils can be reasonably sure that their soil is acid. If they use fertilizers or irrigate their crops, they can be quite certain that their soil is becoming more acid.

Acidity is caused mainly by loss of calcium from the soil. If you've applied fertilizers to your crops and haven't had the expected crop response, then consider excessive acidity as a possible cause. A pH test, which is a measure of the soil's acidity, will show you whether your soil needs lime.

Most horticultural crops grow best in a soil with a pH of 5.5 to 6.0, or a little higher. Initially, a soil may need lime at two tons or more to the acre to bring its acidity into the desired range. After that, a regular check on soil acidity will show you when further liming is necessary.—*D. DOWDLES, Adviser in Horticulture.*

Unprofitable Bananas. Bananas that have ceased to be commercially profitable should be eradicated during the winter months. They're a potential menace to healthy plants.

Weak, unprofitable areas exist in most banana plantations. These areas, which seldom justify the expense of weed control, desuckering and fertilizing, soon become neglected. They are then a very real disease risk in districts where bunchy top has been recorded.

The most economical method of eradication is to inject a hormone preparation like 2,4-D or MCPA into the plant. The hormone is applied through a special injector, the point of which is inserted into the pseudostem, just above the corm. Your local Horticulture Branch officer will supply details of the equipment and its use.—*J. M. WILLS, Senior Adviser in Horticulture.*

Quality in Cauliflowers. A firm, white cauliflower head is an attractive product, and an attractive product commands the top market returns.

When marketing cauliflowers, undoubtedly the major essential is to cut as soon as the curd reaches prime condition. You may get a bigger product if they are left a little longer in the field—but size is of little value when quality has dropped.

And, in this specialized crop, it is quality that counts.

Look at the results of delayed harvesting—

Exposure to wind, sun, rain, insects, and disease, and a corresponding risk of serious curd blemish and loss of buyer appeal.

Leave them too long and they become over-mature, with long stalks and loose, open curds which tend to wilt quickly after cutting.

Cut when the curd is white and firm. Try tagging your plants according to development—these will be ready this week, others for next, and so on.

There is no substitute for quality in cauliflowers. Only an attractive head is a good head.—*R. L. PREST, Senior Adviser in Horticulture.*

Seedbeds. That sad story of the seedbed—the whole basis of a new crop lost in drowned, weakened, or diseased seedlings—don't let it happen to you!

Young seedlings just won't tolerate bad soil drainage.

The seedbed should be well-drained and constructed about 9 in. above ground level. If possible, make a foundation of sand or rubble. Allow for side gutters.

Get rid of that excess water. It may cause water-logging, injure roots, and it certainly favours diseases such as damping off.

Give the bed overhead protection during the "wet" by erecting a movable framework. Over this place hessian or other material, and so protect the tender plants and divert the heavy rains. The covers can be removed in fine weather.

Don't overcrowd the plants. They need air and room to develop. Sow them in rows about 4 inches apart, and thin out to reasonable spacings.

Drainage, protection, aeration, living space—provide these in the seedbed, and you will have a stock of healthy seedlings.—*D. DOWDLES, Adviser in Horticulture.*

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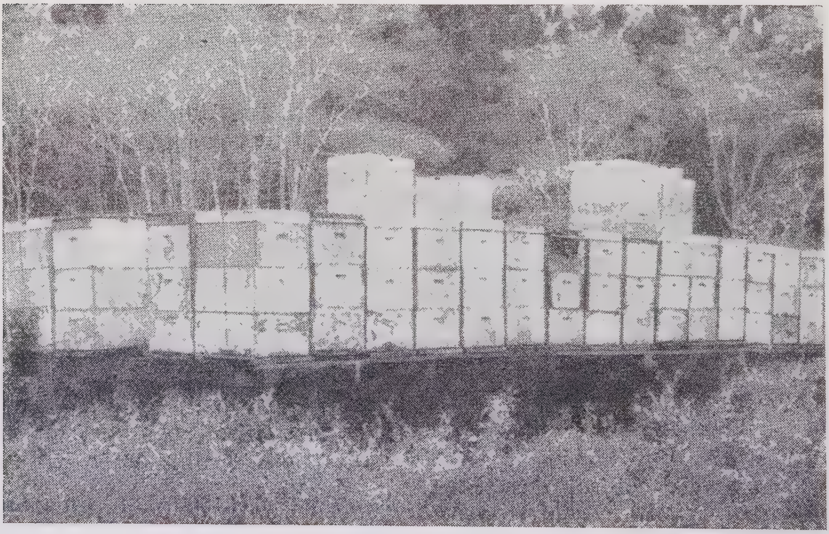
Hives of Industry



In This Jungle Setting, Mr. W. Weare, of Upper Barron, Works His Beehives From the Top of a Trailer. A space for this purpose is left up the centre of the trailer, which is simply towed into a suitable location.

Salt Damage to Citrus

By **W. V. MUNGOMERY, Horticulturist.**

The first precaution to take against salt damage in citrus is to check the quality of the irrigation water. There are a number of remedies to use where salt damage exists.

Trees vary greatly in their tolerance of high salt concentrations in the soil. The date palm is very tolerant, figs and grapes are less so, while in the low tolerance group are citrus together with the pome and stone fruits and the avocado.

Plants react differently to given concentrations of salts, and also to the various elements which occur commonly in saline waters. With citrus, it is the sodium chloride (common salt) in the water which is most commonly harmful.

In most citrus-growing countries of the world, damage due to excess salt has been a problem for many years. In most cases, the damage occurs when the water table rises into the root zone of the plants, bringing with it abnormally high concentrations of salt. This kind of trouble is usually due to over-irrigation of crops grown on shallow soils.

In Queensland, however, salt problems in citrus are mainly the result of under-irrigation, with water of marginal quality. In the Central Burnett district during the 1957 drought, trees irrigated by the permanent overhead sprinkler system suffered very severely.

What To Look Out For.

The first symptoms of salt damage occur in the leaves. These acquire a dull appearance, curl and turn yellowish. Later the margins of the leaves die and turn brown, particularly near the tips. Later again, these leaves fall, the older ones being shed first.

Fruit drop also tends to be abnormally high and the fruits which do develop are smaller than normal and may ripen somewhat prematurely. Very often there is a fair amount of twig die-back.

How Is It Caused?

As mentioned before, salt damage in citrus is usually due to higher than normal concentrations of sodium chloride in the soil or irrigation water. In some cases, the carbonates and sulphates of sodium, magnesium or calcium may be troublesome but this is relatively uncommon in Queensland.

In western districts, bore waters are sometimes high in sodium carbonate, and these tend to make the soil too alkaline for satisfactory plant growth.

In Queensland, most citrus are grown on deep, well-drained soils and salt damage, when it occurs, is due mainly to the use of marginal or poor-quality irrigation water.

Experience in the Central Burnett has shown that toxic quantities of salt can enter the tree in

Plate 1

Overhead Irrigation in Citrus. In prolonged hot weather, overhead irrigation can be dangerous when the salt content of the water is above normal. Salt deposits remaining on the leaves between successive rotations of the spray nozzle are harmful. Watering at night and heavy rates of application are remedies.

two ways, namely, through the leaves or through the roots.

Damage was first observed on orchards where the permanent overhead system of irrigation was used. This system normally has a relatively low application rate; not more than ¼ in. an hour. The weather was hot and dry. Under these circumstances much of the water which fell on the leaves of the trees had time to evaporate between each rotation of the sprinklers. As a result, the salt concentration on the leaves became very high even though the quality of the water was reasonably satisfactory.

Trees were also affected because of the build-up of salt in the soil. Normal irrigation practice aims at applying just enough water to wet the root zone of the plant and no more. However, under drought conditions, there is no leaching of the salts dissolved in the irrigation water into the deeper layers of the soil. The result is that each successive irrigation increases the amount of salt in the root zone. It is easy to see how the continual use of water which would normally be considered quite safe, can eventually lead to the accumulation of injurious amounts of salt in the root zone.

Also, we must not overlook the indirect effects which excessive salt may have on tree growth. When there is an unfavourable ratio of sodium to calcium and magnesium in the irrigation water, the sodium will displace the calcium and magnesium in the soil. This may lead to a deficiency of these last two elements and adversely affect the physical condition of the soil, making it more difficult to irrigate.

How To Remedy

The obvious remedy for salt damage is to change to a better source of water. However, in most instances this is impossible, and the best use has to be made of the water available. Sometimes the salt content of the water may be so high that its use should be discontinued. The salt in the water could do more harm to the tree than the drought, and the grower can only wait for a heavy fall of rain to wash the salt out of the soil.

Next, we come to the case where the water quality is marginal and the use of the permanent overhead system of irrigation has caused damage from the absorption of salt through the leaves. Under these circumstances, the best thing to do is water in the early morning, late afternoon or, preferably, at night. Evaporation will be lower at these times. It will also help if the output of the individual irrigation sprinklers is increased.

When the damage is due to the accumulation of salt in the root zone as a result of the repeated use of marginal water, heavy irrigation is necessary. This will wash the salts through into the deeper layers of the soil out of range of the root system of the trees. The amount to apply should be at least twice that which would be needed to wet the root-zone only. Two or three heavy irrigations will usually bring the salt content of the soil back to a reasonable level.

The ratio of heavy to normal irrigations subsequently will depend on the amount of salt in the irrigation water. If this quantity is approaching the permissible maximum, then a heavy irrigation will be needed every time. However, if the salt content of the water is relatively low, a heavy irrigation may be needed only after perhaps five or six normal waterings.

Even if water for irrigation is in short supply, it is false economy to irrigate lightly when salting is a problem. Of course, these practices are of value only in a soil with free drainage. If drainage is impeded in any way, some positive steps must be taken to improve it.

Where the soil structure has deteriorated from the use of water with an unfavourable ratio of sodium to calcium and magnesium, the addition of gypsum is the remedy normally used. The calcium in the gypsum will replace the sodium in the soil. Rates of application varying from 2 to 20 cwt. to the acre may be used, depending on the nature of the soil and the amounts of sodium to be replaced.

In very acid soils (below about pH 5), agricultural limestone or dolomite can be used in place of gypsum. On the other hand, if the soil is very alkaline (above pH 8·5) an application of sulphur may be effective.

Precautions To Take

The first precaution to take against salt damage is, naturally enough, to check on the quality of the irrigation water being used. Horticulture Branch officers will advise on the procedure for taking samples. Analyses of these samples will then show whether the water is suitable and how it should be used.

Also, in areas where water quality may be doubtful, some attention should be given to the selection of varieties and rootstocks. Lemons are very sensitive to salt. Oranges are more tolerant, and grapefruit are the most tolerant of the commonly grown citrus varieties. No positive information is available on mandarins, though field observations suggest that they

Plate 2

Portable Irrigation Lines in the Orchard. With this system of irrigation, salt damage with waters of marginal quality is mostly due to build-up of salt in the surface layers of the soil. Heavy irrigation to leach excessive salt below the root zone is an insurance against further trouble.

are more tolerant than oranges but less tolerant than grapefruit. This also applies to these varieties when used as rootstocks.

If salt damage is anticipated, sweet orange or Emperor mandarin would definitely be better than rough lemon. Trifoliata is the least satisfactory rootstock. It is even more sensitive to salt than rough lemon.

Fortunately, salt damage does not occur very frequently in Queensland. However, the recommendations given will be found of value when it does.

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Warning to Beekeepers

Recent experience with the introduction of queen bees into Queensland from overseas has shown that the examination of these consignments is of great value in protecting the Queensland beekeeping industry from the introduction of pests and diseases.

All consignments introduced are examined by the Beekeeping Section of the Queensland Department on behalf of Quarantine Authorities and during the last year three consignments have been found to be infested with diseases or pests. Accordingly, these consignments were destroyed in quarantine.

During the last few weeks, one consignment from the United States of America was found to be infested with small mites which invade the breathing tubes of the adult bee. This trouble known as "Acarine Disease" does not occur in Australia, although it is caused by one of the most serious parasites affecting honeybees in other parts of the world, particularly Great Britain and Europe.

Fortunately most Queensland beekeepers are aware of the value of the quarantine examinations, and knowledgeable beekeepers, realising the possibility of introducing disease, are now avoiding importations.—*C. ROFF, Adviser in Apiculture.*

Teamwork Markets High Quality Eggs

By K. C. GUYATT, Division of Marketing.

HOUSEWIVES have long been more suspicious of the humble egg than of most other foods. But lately egg quality has improved, and for this we can thank organised marketing and teamwork between producers, retailers, and the egg marketing boards. All now recognise the perishable nature of eggs and the need to place them fresh into the housewife's hands.

In order to sell a guaranteed product, the egg marketing boards must see that egg quality is kept up. This job is doubly important because it means keeping local customers happy so that they will buy more eggs, and so that this, in turn, will reduce the surplus on the lower-paying, well-supplied export market.

What do the egg marketing boards do? What is their obligation to the farmers who have set them up? And to their customers? What does the farmer owe to his board? We might add something on how the consumers and retailers contribute in maintaining quality of this perishable product. It will be seen that all parties must pull together so that each may benefit.

The Farmer's Part

In the marketing chain, the first link plays a very important part. The good farmer aims to produce a good-sized egg with sound shell texture. When it comes to marketing, however, other things are also important—the internal quality of the egg—and these things are not always so apparent. These matters will be briefly mentioned here but information is always readily available from Agriculture Department poultry advisers. Defects include unsatisfactory yolk colour, enlarged air cells (stale eggs), blood and liver spots, watery whites, and fertile eggs.

Generally, farmers aim to produce an egg of good size and quality. To retain quality, the eggs should be collected regularly from the nest, and to prevent infection of eggs with mould they should be dry-cleaned when necessary rather than washed. Until their dispatch to the board, the eggs should be kept in a cool place and for this purpose, charcoal coolers are now coming into use. Such coolers also help to maintain correct humidity, which prevents evaporation of moisture, and staleness.

Deliveries to the board should be made at least twice a week.

What the Board Does

When the board receives the eggs, an inspector examines them over a bright light. This is called candling, a word which has persisted since eggs were examined over a flame from a candle. Stale eggs, shown by the size of the air cell, and eggs with undesirable internal quality, such as addled eggs, small bloodspots and so on are down-graded for pulping. Cracks in the shell and poor quality shell texture, which is usually shell that is

Plate 1

Operators Feed Eggs to Six of the 20 Vacuum Pulp Extractors at the South Queensland Egg Marketing Board.

fragile and liable to be easily broken, are also detected, and these are the main eggs going into pulp.

After candling, each egg is weighed automatically and stamped to indicate the grade and quality.

The Queensland egg marketing boards fix three quality standards (first and second quality and useless) and three weight determinations. Only first quality "hen" eggs and first quality "small hen" eggs are sold as eggs in shell. Second quality eggs are pulped for pastrycook purposes. First quality hen eggs are 1⅞ oz. and over, whilst first quality small hen are 1½ oz. to 1⅞ oz. The following table shows the grading outturn in 1957-58 of eggs received by The South Queensland Egg Marketing Board.

TABLE 1

GRADING OF EGGS RECEIVED BY THE SOUTH QUEENSLAND EGG MARKETING BOARD (1957–58).

——	Dozens	Per cent.
First Quality—Hen	4,770,853	72·06
First Quality—Small Hen	1,160,770	17·53
Second Grade	680,268	10·28
Third Grade*	876	·01
Duck	496	·01
Useless	7,070	·11
	6,620,333	100·00

* Discontinued from November 24, 1958

Eggs are pulped by a vacuum extraction method and the pulp then pasteurised by a process similar to that used in milk factories but of course at more critical temperatures to avoid cooking. The pulped egg is rapidly hard-frozen in blast freezing tunnels and held under refrigeration pending local sale or shipment overseas.

Service to the Consumer

Local shopkeepers receive board eggs within 24 hours of receival from growers. The board packs in attractive cartons to facilitate handling by the retailer, and to meet the requirements of the modern super-market shopper. The board guarantees all eggs marketed by it and employs service officers who investigate all marketing or quality complaints.

To ensure that supplies are available throughout the year, the best high quality eggs are chosen in the months of high production and dipped in high grade mineral oil. This seals the egg pores and prevents staleness. The eggs are then held in chilled rooms until the low production winter months. Although not of the same high quality as new laid eggs, these eggs nevertheless are of sound quality. This is ensured by candling the eggs before they are placed on the market.

How the Retailer Can Help.

It is agreed that no egg is as good as a new laid egg. All new laid eggs of course are not of top quality but a top quality egg can soon deteriorate if not correctly handled on the farm and in the marketing process. It is unfortunate that many retailers do not buy more regularly—at least twice a week—and often fail to store at cool temperatures to avoid staleness.

How often are eggs found displayed in a hot shop window or in some hot storeroom with other general produce?

How often is it found that newly purchased eggs are sold without regard to disposing of the earlier purchases first?

How often do we see eggs picked up from the wholesale floor and transported in an open truck exposed to the blazing summer sun?

These factors militate against egg quality which the egg marketing board, through its service officer, is attempting to rectify. A road distribution service may be necessary to overcome unsatisfactory transport conditions.

And the Housewife

Today, very few Queensland homes are without the benefit of refrigerator or ice box. This is the place for eggs along with dairy produce and other perishables. If a refrigerator is not available, a cool place out of a draught is the next best thing. In the refrigerator the least cold spot will be sufficient; 55–60 deg. is most suitable. Remember, take from cold storage only those eggs for immediate use. Transferring eggs from low to high temperatures can have as harmful an effect on egg quality as failing to keep them under refrigeration.

◆

The Piglet at Birth

Pigs are born in a rather advanced stage of development: they can see, walk, are covered with hair, and within minutes of birth will find their mother's udder, and settle down to suck the teat of their choice. At birth, more than 80 per cent. of the pig's body is composed of water, but as the pig grows older the composition changes very quickly indeed.

Pigs appear to suckle little and often, and following birth will do so approximately once every hour, day and night. At each suckling, the milk flow lasts only 10-20 sec., the piglets obtaining 10 to 70 ml. milk. Up to 48 hours after birth, the pigs receive colostrum. Thereafter, it is gradually replaced by milk. The main value of colostrum is to provide antibodies which protect the baby pigs against various infections.

THE FARM FAMILY

The Danger of Tetanus

Tetanus in humans is easy to prevent, but difficult, and often impossible, to cure. About 50 per cent. of notified cases who develop symptoms die from the disease, in spite of medical treatment.

Tetanus is an acute fever, caused by the tetanus bacillus, a tiny but very dangerous germ which produces a deadly nerve toxin when it grows in deep wounds, away from sun and air. Tetanus is often called "Lockjaw" because one of the commonest symptoms of the disease is a painful spasm of the jaw muscles.

How It Is Contracted

The germ which causes tetanus lives in the intestines of grass-eating animals, particularly horses, and is most likely to be found in and around farmyards, stables and gardens where the soil is treated with animal manure. The germ is extremely hardy, and can live for years in the dust. There is a risk from tetanus in almost any paddock, garden, footpath or road. Tetanus can be picked up nearly anywhere, particularly by children who play barefooted.

How It Develops

The tetanus germ prefers a deep, punctured wound with a small opening. Such a punctured wound shuts out oxygen and enables the tetanus germs to thrive and increase in their dark, moist hiding place. A deep cut or puncture caused by stepping on a nail or the prong of a fork is much more likely to be followed by tetanus than a surface abrasion. Gunshot and fireworks accidents are especially dangerous, because the force of the explosion can carry the infected material deep into the tissues.

Symptoms

When a wound is neglected, tetanus takes anything from 4 to 21 days to develop. Stiffness of the neck muscles, and painful spasms of the jaw muscles, causing difficulty in swallowing, are often the earliest symptoms. Later on, spasms of the other muscles of the body occur. Often the slightest noise or jarring is sufficient to throw the patient into violent and agonising convulsions. The quicker the symptoms occur, the greater the danger.

The Danger Is Very Real

Once the symptoms of tetanus have developed, it becomes a very serious disease. In Queensland, between 1945 and 1949, there were notified 160 cases of tetanus with a death total of 89—slightly over half. Probably the figures would be much higher but for the fact that most doctors take the precaution of giving an anti-tetanus injection to all accident victims, if there is any risk that dirt may have entered the wound.

Danger to Children

Children are in the danger group. Queensland statistics over the past five years reveal that 36 per cent. of all deaths from tetanus occurred in children under the age of 15 years. This age group comprises only 28 per cent. of the population.

Immunisation

There need be no deaths from tetanus. Anti-tetanus immunisation will safeguard you against this killer. Two or three injections of anti-tetanus toxoid, followed by another dose one year later, and repeated single doses about every five years, are all that is required.

Anti-tetanus immunisation is particularly important for people living in rural areas, or engaged in occupations where there is a special risk of tetanus. Children can—and should—be immunised at 18 months of age.

Save your children and yourself from the death that lurks in dirt. See your doctor or Local Council to-day about Anti-Tetanus Immunisation.

Precautions

If you have not protected yourself by anti-tetanus immunisation, observe these precautions:—

1.—Do not try to close a deep, punctured wound, or think it is unimportant because it is small and appears healthy. Punctured or torn wounds, especially those which are dirty, or have bits of contaminated matter forced into them, require immediate medical attention.

2.—If there is even a remote possibility that you could have been infected by the tetanus germ, make it your business to get an injection of anti-tetanus serum. This should be done as a precautionary measure even when immunisation has been given previously. Most probably your doctor will suggest it; if he does not, be sure to ask whether or not he thinks it necessary.

3.—If any of the symptoms of tetanus develop, do not waste a moment in getting medical attention. Large doses of anti-tetanus serum may save your life. Even a few hours delay can make all the difference.—*Queensland Health Education Council.*

Best Recipe of the Month

MELON CHUTNEY

- **5 pounds of melon**
- **2 tablespoons of salt**
- **1 pound of raisins**
- **1 level tablespoon tumeric**
- **1 tablespoon of flour**
- **3 pounds of onions**
- **1 pound of light brown sugar**
- **1 bag of spice**
- **1 tablespoon of curry**
- **1 teaspoon of pepper**
- **1 pint of vinegar**

Prepare the melon and pass it through a mincer together with the onions. Place the melon, onions, vinegar, salt, sugar, raisins and spices in a pan, bring to the boil and boil slowly for two hours. Then mix the dry ingredients to a thin paste with a little extra vinegar, add this to the contents of the pan, bring to the boil, stirring all the time. Simmer for half an hour. Bottle and seal while hot.

The Things That Make A Leader

By J. PARK,
State Organiser,
Junior Farmers.

IN military organisations, where a good deal of research into the subject of leadership was carried out during the last war, great importance is necessarily attached to the selection of leaders. This should be, but is not always, the same in civil life. In times of peace, many good projects fail because they do not have the right kind of leaders to see them through.

There is a great need today for what might be called minor leaders, men and women who can organise and administer activities in a local or community sphere. Indeed, it might not be incorrect to say that the whole structure of modern life depends upon the ability of certain types of men and women to organise, inspire and lead the great mass of people who are waiting to be led.

Leadership is a problem deriving from social psychology and is a product of the behaviour of groups. The first studies in this field were made with animal groups. It is well known that the leadership tendencies of certain animals are clearly demonstrated. With animals the leader is generally the most massive, the toughest and the most aggressive in the herd. (Exceptions to this rule can, of course, always be found.)

To maintain his position as leader he must constantly do battle with the youngsters of the herd who, from time to time, challenge his place in the leadership hierarchy.

The same sort of thing occurs in human groups, particularly among primitive peoples, where the young challenge the old to do battle. In the more civilized communities the clash frequently occurs between the personalities of the young and the old.

The reason why the young so often break away from and trample down tradition is that they react against the impositions of older leaders, and they reject the rules which have been laid down by the elders for the social conduct of the whole group.

Various classifications of leadership have been made; the one given here is made by Bartlett in his book "Psychology and the Soldier". In it he distinguishes three main types of leaders:

1. **The Institutional Leader—** This type has authority because of the tradition and prestige which a certain institutional type of organisation gives him. An example would be the cartoon character, "Colonel Blimp," who was created as a caricature of the military leader

who, through seniority, attained a high rank, and who was able to wield authority because of the prestige of his rank and the discipline of the military organisation behind him.

His type can usually attain a certain measure of success because of these things alone, apart from any claim to leadership which his personality might give him. This type could of course be a "born" leader, but in the example given and in most other cases he is a product of a particular type of training.

Such a leader will tend to hold himself aloof from his subordinates, needs to be punctilious about details of procedure, somewhat severe in discipline, and to hold rather rigidly to the traditional orders of his organisation.

Today such leaders are probably difficult to find in our military forces, and in voluntary organisations it would be rare to find one such as he attaining any real measure of success. He should not exist in a true democracy, but unfortunately his type may still be found in some of our communities where, through lack of interest, apathy or forbearance on the part of other members he is allowed to carry on.

In youth organisations or youth movements he should certainly not exist.

2. **The Born Leader or Dominant Type**—He is the one whose self-assertion is primarily responsible for bringing him to the fore. But self-assertion alone does not make a leader. We all know the objectionable type of peson who wants to "run" everything and everybody despite the opposition of members of the group. The difference between such a person and the "dominant" type of leader is that the latter combines with his assertiveness such qualities as a capacity for swift action and a willingness to do what he expects others to do.

Such a leader is usually eager to bring about radical changes and to initiate new movements. Often he will blunder in his decisions and he needs the intelligence to profit by and rectify his mistakes. He needs to have complete knowledge of his subject and skill in its performance.

There is a real danger that leaders of this type will become domineering and tend to override others unthinkingly. As a rule leaders of this type have great natural gifts, and they tend to specialise and become expert in some particular field.

3. **The Persuasive Type**—This leader is very often "behind the scenes" as it were, and is responsible for the smooth running and administration of the organisation with which he is associated. He is a far more complex and subtle person than the "dominant" type, and possesses to a greater degree the capacity for knowing or predicting what people will think, feel or do under certain circumstances.

He is thus able to keep ahead of the group, and formulate for them lines of action which will be in accordance with their own desires.

Such a leader will make full use of the quality of "suggestibility" and can take his group where he wants. He possesses a deep understanding of human nature rather than of his particular subject. Note that in this, too, he differs from the "dominant" type.

But to utilize his natural capacity for handling people, to be truly successful, he needs to be alert, intellectual, and must be able to mix with those he wishes to influence. It should be realised that this leader's power of interpretation, that is, his ability to know and predict the thoughts, feelings and actions of others, improves by the exercising of it in practical situations.

Despite this attempt at classification, it should not be expected that any person will fit neatly into one of the groups. There will be a considerable amount of overlapping. A person who by force of personality comes to the fore in a social group may hold his place by possessing some of the characteristics attributed to the third type. For instance he might have a very good understanding of his fellow creatures.

Summing up, it can be said that if a leader has a well-developed personality, is enthusiastic, competent, interested in those he is leading, able to be one of them, yet retain dignity, and is absolutely impartial, he or she has a very good chance of handling successfully the group which requires to be led.

Hints for Club Members

Has your club planned its Field Day for this year? If not, it is suggested that a sub-committee be appointed to go into the matter at once. Confer with your local Agriculture and Stock office and find out how your club might best assist Departmental officers in their job of bringing recommended practices before the notice of farmers.

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100 Years of Queensland Dairying—I.

Queensland Had Only 12 Dairy Cows in 1859

By E. B. RICE, Director of Dairying.

In the closer settlement of Queensland and the establishment and growth of many country towns, the dairying industry has played an influential role.

In the pioneering stages of Queensland agriculture a farmer could settle on land suitable for dairying with the assurance that almost as soon as he started to develop a farm from the virgin scrub or bush a regular cash income would be received from the produce of a few cows. As additional land was cleared and the dairy herd could be increased, his income would steadily rise.

In contrast with most forms of primary production, where partial or complete failure of a crop through adverse seasonal conditions or other factors may mean the loss of all or most income in a year, dairying has always provided a farmer with a regular monthly cheque from the dairy factory which he supplies.

Pioneering Stage to 1900

The first dairy cattle were brought into Queensland from the Illawarra district in New South Wales in the 1840's and depastured near Ipswich. They were evidently few in number, as there were reported to be not more than 12 dairy cows in Queensland when it was separated from New South Wales in 1859.

As population increased, the numbers of dairy cattle rose steadily to satisfy the demand for milk for household use. Any surplus milk was made into butter on the farm.

Dairying methods in this pioneering stage of the new State were primitive. The milk to be converted into butter was poured into shallow pans or dishes about 18 in. wide by 4 in. deep and the pans were placed in a cupboard for 24 hours or longer. The cream which had risen to the surface of the milk was then ladled or skimmed off. The cream was churned into butter in a small hand-operated churn. The resultant butter was sold to, or bartered with, local storekeepers, who retailed it to their customers.

The locally-produced butter was insufficient for the needs of consumers, and butter was imported into Queensland until 1893. The imported butter was reported to be of inferior quality, as in those early years there was no refrigerated shipping of butter.

Travelling Dairy Plant

In 1888 the Government, in its efforts to foster the dairying industry, inaugurated a travelling dairy plant which visited the fast-developing dairy districts for the purpose of demonstrating the use of cream separators and methods of manufacturing butter and cheese.

Mr. Baron Jones was in charge of this travelling dairy.

A second unit was placed in commission in 1889, with Mr. John Mahon (who later became the first principal of the Agricultural College at Gatton) in charge.

The first plant continued until 1892, but the second travelling dairy continued its demonstrations until 1896. The equipment of a travelling dairy consisted of one horse-operated separator, two hand separators, one Lister cream tester, two wooden box churns, one cheese vat, one cheese press, cheese moulds, a curd rack and curd cutter.

There was an almost immediate change effected in dairying through the activities of the travelling dairies, and small factories were built in rapidly increasing numbers.

There are conflicting reports on when the first dairy factory was erected in the State, possibly due to differing opinions as to what would be defined as a factory in those times. Some, perhaps, gave this term to a place where simple mechanical facilities were provided, and where milk was purchased from neighbouring settlers, as distinct from the farm operation of making butter by a hand-churn solely from surplus milk.

However, the first central dairy is claimed to have been established by Mr. C. H. Buzacott at Hampton on the Crow's Nest branch railway in 1887. This factory is mentioned in a booklet titled "Dairying in Australia", published in 1902 as a reprint of a series of articles by the agricultural editor of *The Queenslander*.

A special committee appointed by the Queensland Council of Agriculture in 1923 stated in its report on "History of Queensland Dairying, together with Investigation of Its Problems of Production and Marketing" that the first cheese factory of any pretension was erected at Yangan in 1893, and the first butter factory at Allora in 1895. Possibly these establishments were more deserving of being described as factories, but the annual reports of the Department of Agriculture mention the numbers of factories from 1890 onwards.

Brisbane Factory

A central butter factory was erected at South Brisbane in 1890 and by the end of that year there were eight cheese and butter factories and five creameries. The creameries were wooden buildings where a steam-driven cream separator was installed. Nearby farmers took their milk to the creamery, which, after separating the milk, sold the cream to a central butter factory and returned the skim milk to the farmers. This so-called "separator" butter was of better quality than the farm-made or imported butter and attracted a higher price.

The early records show that among those places where the first small factories were established were Lanefield, Brymaroo, Oxenford, Grandchester, Aubigny, Greenmount, Pilton, Quinalow and Toowoomba.

Farm Separators

About this time, farm separators were first imported into the State and gave a great stimulus to dairying. By their use, the farmer was relieved of the necessity of taking his produce daily to the factory. As cream has better keeping quality than milk, the farmer was able to forward his cream to the factory several times weekly instead of by the daily delivery necessary for milk. Farms farther away from the factories or creameries then began to be developed for dairying.

In 1895, nearly 200 separators were purchased by factories and farmers. Evidently they increased in numbers very rapidly in the next few years as there is mention in 1900 of their advantages in helping to open up dairy farms further away from factories, and to provide skim milk for calf and pig raising, being offset by neglect of proper cleaning of these machines. It was stated that much of the farm-separated cream was far too advanced in age to permit of it being made into high quality butter, that general failure to keep separators clean was a serious threat to the progress of dairying and some means would have to be devised to check the ill-effects to the industry which were arising from the irrational use of farm separators.

Bonus For Export Butter

To foster expansion of dairying, the government in 1894 offered a bonus of ¼d. a lb. for all butter shipped overseas.

The first shipment of butter from Queensland to London was in 1895. A total of 17 tons was exported in that year but by 1898 exports had risen to 436 tons. The advent of refrigerated shipping space stimulated the export trade, but Queensland produce had first to go to Sydney by interstate steamers and was transhipped there on to overseas ships. Ships of the Aberdeen line commenced to call at Brisbane in 1903 in order to load dairy produce and ship it to the United Kingdom.

By 1895, there were in existence 23 small butter and cheese factories and 27 creameries.

Competition for cream supplies soon after the factory system began was obviously keen. The booklet previously mentioned states that in some instances cream so bad as to be wholly unfit for use was rejected by one or two companies, but was bought by another. Preservatives were added to the butter made from the cream.

It went on further to say that some factories made the worst quality cream into butter, which they did not brand but sold in the name of the carter who conveyed it from the factory. However, it appears that by 1900 some improvement was already taking place, as mention is made of increasing local consumption due to the better quality of the article and its lower cost.

Once A Day Milking

In the pioneering years before 1900, cows were mostly milked once daily and calves were allowed to run with them. The farmers relied on the indigenous grasses for the grazing of their herds. The potentiality of paspalum as a pasture grass appears to have been recognised about the end of the century, as there is reference to its seeming to offer the foundation for enduring success for dairy farmers and graziers.

Efforts in Herd Improvement

Agricultural show societies first stimulated interest in improving the quality of the dairy breeds by providing competitions at which initially the animals were judged on conformation to dairy type. Later, the competitions also included milking contests. The earliest records of winners at show competitions are for the Brisbane Exhibition in 1885, when the dairy cattle exhibited were of the Jersey and Ayrshire breeds only.

The estimated number of dairy cattle in the State in 1896 was 80,000.

Milking Competitions

In 1897, a scheme was started for the improvement of dairy cattle by means of milking competitions in different districts. Successful competitors were registered by the Department of Agriculture and permitted to carry a specified brand. In 1905, the scheme was amended to require a cow to be milked, under the supervision of a Departmental Officer, for a test period of two days, and the cow had to have a calculated record of not less than 12 lb. of butter for a week.

The following figures depict the extent of the dairying industry at the close of the last century:

Butter and cheese produced were estimated to be valued at nearly £500,000 and the contingent products of the dairy industry, such as bacon and ham, were valued at £250,000.

In 1899, there were 256 butter and cheese factories and 438 creameries. Altogether 930 establishments were handling cream only, and 4,740 were handling butter and cream. The total quantity of milk dealt with for manufacture into butter on the farms, in factories and in creameries was 22,934,000 gal. This was converted into 5,796,000 lb. of butter in central factories and 2,666,000 lb. on farms, or a gross total of 8,462,000 lb. The appreciable proportion of farm-made butter is obvious.

Two hundred and twenty-one producers of cheese used 1,911,000 gal. of milk in the manufacture of 1,910,000 lb. of cheese.

The exports were 1,159,255 lb. butter valued at £49,517, and 11,358 lb. cheese worth £250.

Co-operative Factory Movement

The earliest dairy factories were all owned by proprietary companies or private individuals. Although some of the creameries were co-operatively owned by the producing suppliers, they forwarded the cream to proprietary butter companies.

A co-operative factory at Lanefield had 50 suppliers in 1892. In 1894, four factories and one creamery were co-operatives, while the total numbers were 16 factories and 13 creameries.

A co-operative butter and cheese factory was established at Tiaro in 1890 and found a ready market for its products in Gympie, which was then a flourishing gold mining town. However, this factory apparently was short-lived as a co-operative and closed in 1892. It was acquired by, and operated as a branch butter factory of, the Lowood Creamery Co. Ltd., for an advertisement by that company in 1902 included the Tiaro factory among its factories. Its other branch butter factories were at Boonah, Beaudesert and Toowoomba, and it owned a cheese factory at Yangan.

The co-operative movement in the sphere of dairy products manufacturers began to displace proprietary interests in the early 1900's. The Queensland Farmers' Co-operative Association was formed in 1900 and in May, 1901, commenced to manufacture butter at a factory established at Booval. Its production for the year ended

April 30, 1902, was 1,094,906 lb. butter. Thereafter, co-operative dairy associations soon gained ascendancy.

The Maryborough Co-operative Dairy Association's annual reports indicate that it was also in existance in 1901; 33,309 lb. of butter were made for the year ended June 30, 1901.

The Downs Co-operative Dairy Association, Toowoomba, was founded in 1902 and the Port Curtis Co-operative Dairy Association in 1904. This company's annual reports show manufacturing data for the year ended June 30, 1906, when 8,038 lb. of butter were made: There were only 32 suppliers to the Association for that year.

These four pioneer co-operative dairy companies are now the largest dairy companies in the State.

Nowadays, Queensland dairy farmers, through their co-operative factories, largely control the manufacture into butter and cheese of the milk and cream produced by them. In recent years in most parts of the State, the co-operatives have also engaged in the pasteurised milk trade. In 1958, only one of the 48 butter factories, five of the 24 cheese factories, and four of the 18 pasteurised milk factories in the State were not conducted by co-operative associations.

The First Legislation

The Meat and Dairy Produce Encouragement Act of 1894 was the first statute passed with the object of fostering the dairy industry. It provided for loans to be made available by the Department of Agriculture for the building and equipping of dairy factories.

The Dairy Produce Act was originally passed in 1904 and came into effect on April 1, 1905. It was the first Act governing the manufacturing side of the dairy industry in Australia, although a Dairy Supervision Act was passed in New South Wales in 1901 to deal with control of milk and cream production on farms. This Act was repealed by the 1920 Act to which many amendments have been made in the meantime.

A Government Dairy Expert (Mr. G. Sutherland Thomson) was appointed to the Department of Agriculture and Stock in March, 1904, and in that year Queensland was the first State to enforce butter grading. The compulsory grading of cream was introduced on August 1, 1908.

A Margarine Act was passed in 1910.

The Co-operative Agricultural Production and Advances to Farmers Act, 1914-1919, superseded the Meat and Dairy Produce Encouragement Act, but limited loans to co-operative associations. It also assisted farmers to purchase dairy stock. This Act was repealed in 1923, but additional facilities then became available for co-operative dairy companies and dairy farmers under the Agricultural Bank Act of 1923.

Subsidy for Bulls

A scheme for payment of a £ for £ subsidy to purchasers of purebred dairy bulls which were the progeny of a cow entitled to registration in the advanced register of Dairy Cattle Breed Societies was introduced in 1925. This scheme was amended in 1932 by limiting the Government's contribution to a refund of rail freight and in that year the Dairy Cattle Improvement Act was passed.

A main provision of this Act was the registration of dairy bulls, but, due to intense opposition by farmers, the bull registration scheme was never implemented.

The Primary Producers' Organisation and Marketing Act was passed in 1926. It was considered the most progressive legislation of its kind in any country at that time, and provided for the organised control of the marketing of primary products by boards constituted of representatives of the producers of the various commodities. A board was only formed after a poll of producers indicated their wish to engage in such a form of controlled marketing.

Marketing Boards

The butter and cheese sections of the dairy industry, which had previously set up marketing boards, were among the first to form boards under the new legislation.

Provision was made under an amendment of the Dairy Produce Acts in 1935 for the organised control of the transport of milk and cream to factories by the gazettal of milk and cream routes to factories and the licensing of milk and cream carriers.

Action was first taken to gazette routes in 1937. This amendment was designed to assist in quality improvement by ensuring that milk and cream supplies generally were forwarded to the nearest factory, to avoid uneconomic competition by factories for supplies, and to prevent undesirable practices, such as improper cream grading and subsidising transport costs.

During the war years of 1939-45, action was taken to eliminate some overlapping which existed in the cream routes originally gazetted to the factories. A committee was appointed in 1940 to examine the practicability of zoning cream supplies for butter factories, but, after submission of its report, no action was taken to implement a factory-supply zoning scheme.

In 1939, the Margarine Act of 1910 was amended. It defined table margarine and provided for quotas to be determined for its manufacture. Quotas aggregating 645 tons yearly were allotted to three firms in 1941. However, due to the difficulty of obtaining raw materials, the quotas were not attained until 1947-48. Subsequent amendments of quotas were 1,600 tons in October, 1951, 6,860 tons in May, 1953, and 4,236 tons in July, 1954.

The Act was repealed in 1958 and a consolidated Act passed. It provided for two specific types of margarine—cooking and table—and the packages containing same to have printed on them the type of margarine within the wrapper.

A Filled Milk Act was also passed in 1958 to prevent the production and sale in Queensland of any imitation milk made from non-fat milk solids and vegetable oils as a replacement of butterfat.

(TO BE CONTINUED)

Herd Recording as an Investment

By S. W. IVERS,
Herd Recording Section.

MANY dairy farmers do not realise the financial assistance they are receiving from herd recording. Under the present arrangements, the farmer pays 10s. a cow for each lactation, the State Government contributes a further 10s. and the Commonwealth Government a further subsidy of 6s. 8d. per cow.

In actual fact, every time a cow comes into production and is recorded as A class, the farmer receives the equivalent of about 26s. 8d. for a direct financial outlay of 10s.

There is no other investment on the farm which carries such potentialities. Follow this through to the finish of the lactation and add culling programmes, improved farm practices, production increases and you can appreciate the implications of production recording of herds.

What Costs are Involved?

It is interesting to know just how this money is spent. There are three main channels of expenditure—

(i.) The capital cost of equipment.

(ii.) The necessity for a maintenance reserve of equipment.

(iii.) Operational costs in the field.

(i.) To commence a group requires a capital outlay for equipment of about £200. A group comprises about 20 herds in a district. The recorder travels from farm to farm testing the cows for two consecutive milkings at approximately monthly intervals.

This expenditure provides for all necessary equipment for normal group operations. A recorder comes to a farm fully equipped and the farmer should not have to provide any equipment. Some of the equipment has been specially designed and improvements are constantly being sought and incorporated.

The basic idea is to improve the utility of the equipment and to streamline operations to reduce costs and improve overall efficiency of herd recording operations.

(ii.) Many items of equipment have to be manufactured from glass and the wastage in some of these items is high. Milk test buckets require retinning about once each year. Babcock testing machines require a complete overhaul every few years as machines deteriorate rapidly with age. Sulphuric acid for the testing of the milk is difficult and dangerous to handle and store under field conditions. It is issued in smaller quantities to the recorder and this stock is replenished on regular schedules. The aim is to prevent a build up of acid in areas. There are three reasons for this—

(*a*) Large quantities of acid can cause storage problems.

(*b*) As the acid becomes old, it loses its strength.

(*c*) By keeping reserves to a minimum, charges for the hire of jars and crates are kept down.

All of these factors add to a value of over £2,000 which is required for replacements to service the groups throughout the State. To keep costs to a minimum, replacement equipment is purchased in bulk and issued to herd recorders as they require it. A close check is kept on wastage within groups for such things as carelessness or the irregular use of equipment on issue. Equipment is inspected throughout the year as a check of its mechanical condition and to ensure that it is capable of doing the work efficiently.

(iii.) As with many industries, labour costs are the major item of expenditure. Wages have increased steadily since 1948 and have been the major cause of rises in herd recording fees. These, coupled with expenses for the running of vehicles, account for the major proportion of costs.

The proportion of total expenditure necessary to pay labour and mileage costs is listed in Table 1.

TABLE 1.

SUMMARY OF HERD RECORDING COSTS (AGGREGATED TOTALS) 1957/1958

	Per cent.
Salaries of Herd Recorders . .	82
Car Mileage Allowances . .	13
Apparatus supplied to Groups	2
Sundries (Tax, Postage, Freights, &c.)	3

What The Farmer Receives

So much for the debit side of recording—what of the credit side? For an outlay of 10s. the farmer is receiving a subsidy which should induce him to consider the recording of his herd. If he can increase the average production from each cow by a mere 3 lb. of butterfat, he has recouped his outlay and any further increases are his as profit for the year's operations. Many farmers have done this by culling some of their low producers and giving their higher producing cows more to eat. Herd recording provides a check on feeding practices, and improvements in this direction quickly give responses in butterfat production.

Herd recording can be likened to a mechanical auditor. The farmer has no other means available for measuring the actual yield of milk and butterfat of each individual cow. He must be certain that the value of the output of milk and butterfat is greater than the value of the input of feed. He must know how each cow responds to feeding rations or cropping programmes, and how changes of feed are reflected in the milking bucket.

Farmer members of groups also receive value for their money in the information that is passed back to them from the Herd Recording Section. Each month the farmer is provided with a progressive total of each cow's production. At the close of the recording year in September, annual summaries are forwarded with the list of all cows that have completed lactations grouped in their butterfat ranges and age groups.

Allied to this is the sire surveying service which indicates whether the sire is raising herd production. The results of surveys are based on factual information received from group members and form part of routine farm management. An additional feature of this survey is the permanent tattooing of all daughters to ensure accurate identification throughout their milking life.

It is imperative that the work of a sire be assessed as quickly as possible. It is unfortunately true that in Queensland herds, about 20 per cent of the bulls being used are incapable of raising herd production. Accurate assessment can only be based upon a comparison of the daughters with the remainder of the herd. To obtain correct comparisons, all productions are corrected to a "mature equivalent" production based on well-established conversion factors. The effect on production of an unsuitable bull takes years to eliminate and farmers must be on the lookout for such sires in their herds.

Useful Surveys

Surveys already carried out or being investigated are—

(i.) Seasonal calving.
(ii.) Effect of age at first calving on production.
(iii.) Effect of length of dry period on production.
(iv.) Effect of period between calving on production.

Perhaps the most widely accepted of these has been seasonal calving which is practised on many farms today.

Farm visits to each member are paid by officers throughout the year where results are discussed and programmes laid down for future activity designed to increase production and reduce costs.

Many farms have been recording for a long period now and have sufficient figures for a constructive plan for "grading-up" the herd. This requires that the herd be divided into three groups according to their production. The progeny from the top-producing group is used to replace cows in the lower bracket and so gradually the "tail" drops off as the herd average rises.

It is certain many producers could utilize the benefits of herd recording to advantage. Briefly these benefits are provided in—

(i.) Monthly recording of each cow's production.
(ii.) Progressive totals each month which give production in milk and butterfat for each cow and the number of days she has milked.
(iii.) Annual herd summaries each year indicating the production and length of lactation of each cow.
(iv.) Assistance and advice from departmental officers on farm planning, setting up feeding, breeding and culling programmes.
(v.) The identification of female calves by tattooing.
(vi.) The compilation of sire surveys when sufficient data is available.
(vii.) Recommendations arising from surveys which are being regularly conducted.
(viii.) Guidance with the selection of replacement stock.
(ix.) Guidance in designing and keeping systems of dairy records.

Tuberculosis-Free Cattle Herds (As at 1st September, 1959)

Aberdeen Angus

Crothers, G. H. & H. J. "Moorenbah", Dirranbandi
Elliott, A. G., "Ooraine", Dirranbandi
Mayne, W. H. C., "Gibraltar", Texas

A.I.S.

Cox, T. L. & L. M. J., Seafield Farm, Wallumbilla
Crookey, J., Arolla A.I.S. Stud, Fairview, Allora
Davis, W. D. "Wamba", Chinchilla
Dennis, L. R., Diamondvale, A.I.S. Stud, Mundubbera
Edwards Bros. "Spring Valley", A.I.S. Stud, Kingaroy
Evans, E. G., Lauraven A.I.S. Stud, Maleny
Green, D. B., Deloraine, A.I.S. Stud, Fairdale
Heading, C. A., "Wilga Plains", Maleny
Henry, Mrs. K., Greenmount
Henschell, W., "Yarranvale", Yarranlea
H. M. State Farm, Numinbah
Littleton, H. V., "Wongalea", Hillview, Crow's Nest
Marquardt, A. C. & C. R., "Cedar Valley", Wondai
Mears, G. S. & E., M. S. 755, Toogoolawah
Moore, S. R., "Sunnyside", West Wooroolin
Neale, D. G., "Groveley", Greenmount
O'Sullivan, Con., "Navillus", Greenmount
Phillips J. & Sons, "Sunny View", Benair, Kingaroy
Power, M. F., "Barfield", Kapaldo
Queensland Agricultural High School & College, Lawes
Radel, R. R. & Sons, "Happy Valley", Coalstoun Lakes
Roche, C. K., Freestone, Warwick
Sanderson, W. H., "Sunlit Farm", Mulgildie
Schloss, C. J., "Shady Glen", Rocky Ck., Yarraman
Scott, M. E. & E., "Wattlebrae", A.I.S., Stud, Kingaroy
Scott, W. & A. G., "Walena", A.I.S. Stud, Blackbutt
Shelton, R. A. & N. K., "Vuegon" A.I.S. Stud, Hivesville, Murgon
Sokoll, A. H., "Sunny Crest", Wondai
Sperling, G., "Kooravale", Kooralgin, Cooyar
Sullivan Bros. "Valera", Pittsworth
Sullivan, D. "Bantry", Pittsworth
Sullivan, F. B., "Fermanagh", Pittsworth
Thompson, W. H. "Alfavale", Nanango
Webster, A. H., "Millievale", Sabine, via Oakey
Wieland, A. W., "Milhaven", A.I.S. Stud, Milford, via Boonah

Ayrshire

Dudgeon, C. E. R., Marionville Ayrshire Stud, Landsborough
Dunn, T. F., "Alanbank", Gleneagle
Goddard, B., Inverell, Mt. Tyson, via Oakey
Holmes, L., "Benbecula", Yarranlea
Mathie, E. & Son, "Ainslie", Maleny
Scott, J. N. "Auchen Eden", Camp Mountain
Zerner, G. F. H., "Pineville", Pie Creek, Box 5, Post Office, Gympie

Friesian

Behrendorff, E. C., Inavale Friesian Stud, M.S. 786, Boonah
Macdonald, S. E. G., "Freshfields", Marburg
Naumann, C. H., "Yarrabine", Yarraman
Pender, D. J., Lytton Road, Lindum
Stumer, A. O., Brigalow, Boonah

Guernsey

Doss, W. H., Degilbo, via Biggenden
Fletcher, A. B. "Cossart Vale", Boonah
Holmes, C. D. (owner Holmes L. L.) "Springview", Yarraman
Johnson, G. L. "Old Cannindah", Monto
Miller, G. "Armagh Guernsey Stud", Armagh, M.S. 428, Grantham
Ruge, A. & Sons, "Woowoonga", via Biggenden
Sanderson, N. H. "Glen Valley", Monto
Scott, C., "Coralgrae", Din Din Rd., Nanango
Swendson, A. C., Coolabunia, Box 26, Kingaroy
Wissemann, R. J., "Robnea", Headington Hill, Clifton

Jersey

Beckingham, C. Trout's Rd., Everton Park
Birt, W. C. M., Pine Hill Jersey Stud, Gundiah
Borchert, Mrs. I. L. M., "Willowbank" Jersey Stud, Kingaroy
Burrows, R. N., Wondai, Box 23
Bygrave, P. J. L., The Craigan Farm, Aspley
Carpenter, J. W., Flagstone Ck., Helidon
Conochie, W. S. & Sons, "Brookland", Sherwood Rd., Sherwood
Cramb, S. A., Bridge St., Wilsonton, via Toowoomba
Crawford, R. J., Inverlaw, Kingaroy
Farm Home For Boys, "Westbrook"
Fowler, P. & Sons, "Northlea", Coalstoun Lakes
Gregory, P. H. F., "Carlton", Rosevale, via Rosewood
Harley, G., "Hopewell", M.S. 189, Kingaroy
H. M. State Farm, Palen Creek
Hutton, D. R., "Bellgrath", Cunningham, via Warwick
Johnson, H. G., Windsor Jersey Stud, Beaudesert
Lau, J. F., "Rosallen", Goombungee, Toowoomba
Matthews, E. A., "Yarradale", Yarraman
McCarthy, J. S., "Glen Erin", Greenmount, Toowoomba
Meier, L. E., "Ardath Stud", Boonah
Noone, A. M. & L. J., "Winbirra", Mt. Esk Pocket
Porter, F., Conondale
Queensland Agricultural High School & College, Lawes
Ralph, G. H. "Ryecome", Ravensbourne
Scott, Est. J. A., "Kiaora", Manumbar Rd., Nanango
Semgreen, A. L., "Tecoma", Coolabunia
Seymour, B. T., "Upwell", Jersey Stud, Mulgeldie
Smith, J. A. & E. E., "Heatherlea", Jersey Stud, Chinchilla
Tatnell, W. T., Cedar Pocket, via Gympie
Toowoomba Mental Hospital, Willowburn
Verrall, F. W., "Coleburn", Walloon
Weldon Brothers, "Gleneden", Jersey Stud, Upper Yarraman

Poll Hereford

Anderson, J. H. & Sons, "Inverary", Yandilla
Hutton, D. R. & M. E., "Bellgrath", Cunningham, via Warwick
McCamley, E. W. G., "Eulogie Park", Dululu
Maller, W., "Bore View", Pickanjinnie
Wilson & McDouall, Calliope Station, Calliope

Poll Shorthorn

Leonard, W. & Sons, Welltown, Goondiwindi

Bucket and Bail

Have Your Calves Identified.—The identification of calves was initiated in 1955, when Herd Recorders commenced tattooing heifer calves in both ears. Symbols were placed in each calf's right ear to represent the recording group and herd number. A letter indicating the year of birth was placed in the left ear together with the number of the calf.

This procedure has been continued each year and in 1958 and 1959 the positive identification of calves has played a big part in the breeding and improvement plans of recording members.

Any breeding plan must be based on the positive identification of calves and their parents.

Sire Surveys may be made as early as possible if daughters of bulls are identified when they come into production. A private survey is made when at least six daughters have each completed a lactation, and a preliminary survey (which is more accurate) is made when 10 daughters have each completed a lactation. This means that by tattooing calves and keeping records of them the worth of your bull may be gauged, in many cases, while he is still on the farm.

On the female side, the production records of identified animals will direct attention to superior or inferior cow families.

In 1958, calves were tattooed with D in their left ears. It is noted that 6,988 calves were marked in 683 herds. This means that only about two thirds of recording members are making use of this service. If you are one of the members whose calves have not been marked, have them ready for the Herd Recorder when he visits you next time.

Keeping Milk Free from Weed Taints.—Methods of controlling weed taints in dairy produce will be demonstrated to Queensland farmers by the Agriculture Department this year. These methods have proved successful overseas.

Last year was one of the worst on record for weed taints in Queensland dairy produce. Because of their serious incidence, a great deal of butter was downgraded and some milk supplies were rejected by the factories.

Weed taints in dairy produce are common in winter and spring. Taints are most troublesome after a wet winter when there has been profuse weed growth. Most winter weeds are palatable to stock and quite nutritious, but they cause unpleasant taints in milk. Heat treatment only intensifies some of these off-flavours.

Controlled grazing and spraying pastures with hormone weedkillers will be demonstrated as methods of preventing, or at least reducing, weed taints.

Two Ipswich district farms have been selected for field trials on the control measures this weed season. On one, oats will be grazed after having been sprayed with a hormone weedkiller to destroy the troublesome weeds.

On the other farm, the merits of controlled grazing will be studied. Cows will be grazed on a weed-infested lucerne crop and removed two, four and six hours before milking. Aim of this is to find out what interval is needed for the chemical causing the taint to pass out of a cow's bloodstream.

It is believed, however, that these measures are successful only against certain types of weeds. The problem is made more difficult in Queensland, where lesser swine cress is a widespread weed that does not readily lend itself to these methods. As a long-range remedy, the provision of good quality improved pastures giving proper ground coverage should eliminate these problem weeds.

—F. C. COLEMAN,
Director of Dairy Field Services.

Plans for October

Join a herd recording group to find out which cows are profitable.

Construct a bull paddock to enable controlled mating.

Mate cows now to ensure seasonal calving.

Cool milk and cream to preserve quality.

With warm weather approaching, carefully check cleansing methods.

* * *

The Growing of Lupins

J.L., of Capella, seeks information on the use of lupins in his district.

Answer: The most frequently grown lupin is the Blue lupin which is an autumn to winter growing legume. It is grown in the Granite Belt, usually on stored soil moisture accumulated during the summer months.

In the Granite Belt, the soils on which the crop is grown are much more sandy than those around Capella. This difference in soil type may prove a difficulty in the successful culture of the lupin.

A trial planting of lupins on the sandy soils at Coolum on the near north coast did not perform well the first year. However, the second year the lupins showed much more satisfactory growth. Whether or not this was due to soil fertility or inoculation disturbances is not known.

Generally it is considered desirable to inoculate all legumes with the appropriate inoculum prior to planting in order to ensure better germination and plant growth. Appropriate inoculums for most legumes are available from the Department.

As there are other legumes which may suit the purpose of improving soil fertility in the Central Highlands, a consultation with the local Adviser in Agriculture is suggested, who will be able to make recommendations and give advice based on local knowledge.

Irrigated Pasture For Dairy Herd At 2d. A Head

By L. E. BRANDS,
Adviser in Agriculture.

A cost of 2d. per cow per day gives this dairyman financial security and mental peace, even in times of drought.

THE story is about a dairy farmer in the Toowoomba agricultural district who had realized for a long time the hazards of our climate and its allied variations in production. Some customary methods of fodder production and conservation had been practised, but did not prove fully satisfactory. For this reason, irrigation was looked upon as a way out, and in March 1958, a bore was sunk. At a depth of less than 100 ft. a supply of 10,000 gallons an hour was struck.

Flood Irrigation

The same month, Agriculture Department officers finished a flood irrigation layout for 4 acres of lucerne and 6 acres of a pasture-clover mixture, consisting of *Phalaris tuberosa,* H.I. rye, ladino white clover and montgomery red clover.

Plate 1

A Close-Up of the Flood-Irrigated Clover Pasture of 6 Acres That Helped to Feed a Herd of 33 Dairy Cows.

Grazing of the pastures commenced in July and continued right through the summer to this day (April 29). Each day, an average of 33 cows (26 milkers and 7 forward and backward springers) fed on the mixture and at night were put on sudan grass and sweet sorghum. Naturally, during wet weather the herd was kept off the irrigated pastures and grazed the native grasses.

Of this property of just over 400 acres, 300 are under cultivation (including the irrigation paddock). Before irrigation was practised, 100 acres of cultivation were utilized to provide fodder for the cows. It has proved possible to bring this acreage down to 45 acres. In other words, an extra 55 acres could be used for grain production. The soil, formerly timbered with box, is capable of producing a 15 bag to the acre barley crop, which means a gain of some £800. Let us remember this figure.

How did the lucerne do? So far, the 4 acres produced 630 bales in 5 cuttings and another cutting is due shortly.

These Were The Costs.

To gain an insight into the costs of this irrigation project, the following figures are given:

	£	s.	d.
Costs of establishing water supply, (bore, casing, etc., including turbine pump)	1,250	0	0
Survey and supervision of layout	nil		
21 timber inlet-boxes at 11s.	11	11	0
Steel and timber posts and insulators to divide the 6 acres into 9 paddocks	25	15	0
Implements used for layout (leveller, crowder and delver)	27	18	3
Total ..	£1,315	4	3

If the depreciation is stretched over 10 years, depreciation costs amount to some £130 a year or £13 an acre. In a normal year, eight 3-acre/inch waterings are to be given. Fuel costs to drive the pump amount to £1 for one 3-acre inch watering or £8 per acre per year.

The total costs per acre per year (labour costs not calculated) are thus £21.

Plate 2.

Cows in Good Condition Strip Graze the Pasture That was Provided for Them at a Cost of 2d. a Head a Day.

Annual cost of maintaining the 6-acre pasture area is £126. This area has been divided into 9 paddocks. Two at a time provide grazing for a fortnight. The same area is grazed once every two months. This amounts to 2d. for each cow for a full grazing day.

Cheap Lucerne

It is interesting to see how the lucerne worked out. The price is based on contracting:

Baling (a bale)	2s. 0d.
To mow one acre	10s. 0d.
Hire of rake (an acre) . .	2s. 6d.
Cart in and stack (a bale) . .	1s. 0d.

With an average yield of 31 bales, contracting costs amounted to £5 5s. 6d. per acre per cutting. The lucerne was given a total of 7 waterings, which adds another £1 8s. Depreciation costs amount to £2 12s. Total costs for 1 ton of prime lucerne-hay £9 5s. 6d.

To conclude this story it should be added that, a few weeks ago, the area under pastures was increased to 13 acres. Moreover, the tractor to drive the pump was permanently displaced by a diesel engine (value £400) with a direct universal drive coupling to the pump. The general costs picture, however, will be influenced only favourably by these measures. And remember the saving in cultivation. Also the average monthly cream cheque of £145. And who could calculate the value of mental peace?

Certified Sweet Sudan Grass

FOR those farmers who wish to plant a quick-growing summer fodder crop for their dairy herds and at the same time be sure that they are not introducing Johnson grass to their farms, there is now available a substantial quantity of certified sweet sudan grass seed.

This seed, produced under the Department of Agriculture and Stock's certification scheme, was grown during the current year and has only recently been certified. Its desirable features are its trueness to type, very high germination, freedom from weed seeds, including complete freedom from Johnson grass seed, and a very small percentage of inert matter.

Quite a great deal of the uncertified sweet sudan grass seed available for sale contains a proportion of seed with either black or dark glumes. The sweet sudan grass seed produced under the Queensland certification scheme, although not being completely free of dark glumed seed, has only a very small proportion of seeds which do not have the true sienna colour which is a distinct characteristic.

To ensure its trueness to type is maintained, sweet sudan grass crops grown for certification purposes must have an isolation distance of 40 chains from all other sorghum and sudan grass crops. Inspections made of the land before planting and of the crop during its growth ensure that the crop is grown in accordance with certification requirements. In addition every precaution is made during seed cleaning to prevent contamination of the seed.

Farmers can, therefore, confidently purchase Queensland certified sweet sudan grass seed knowing that the seed they are buying is true to label.

—*N. V. HIBBERD, Standards Branch.*

Improved Pastures Will Fatten Cattle In Far North

By S. R. WALSH,
Adviser in Agriculture.

The tropical coastal district of the far north offers an opportunity for the establishment of a sound cattle-fattening industry based on improved pastures.

The far northern area, which embraces portions of the Cardwell, Johnstone, Mulgrave and Douglas Shires, is unique in having extensive areas of suitable soil for pastures with an assured rainfall and ample water supply.

The closeness of the breeding areas in Cape York Peninsula and the Gulf regions assures a supply of store cattle, most of which are sold through the Mareeba sales yard.

It has been demonstrated at the Bureau of Tropical Agriculture, South Johnstone, that store cattle can be fattened quickly on tropical pastures in the far north.

The location of the fattening areas together with the principal towns in relation to the breeding areas are shown in Plate 1.

Fattening in the Thirties

The use of this coastal area for fattening dates back to the early period

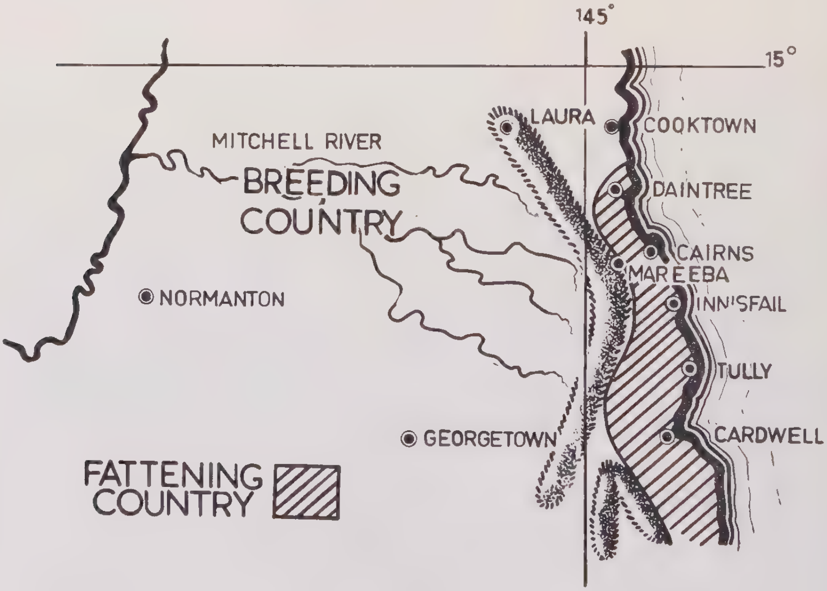
145°
15°
LAURA
COOKTOWN
MITCHELL RIVER
BREEDING COUNTRY
DAINTREE
CAIRNS
MAREEBA
INNISFAIL
TULLY
CARDWELL
NORMANTON
GEORGETOWN
FATTENING COUNTRY ▨

Plate 1

in the 1930's when store cattle were brought from the inland area and fattened under intensive grazing conditions on the Daintree river flats.

Later, portions of the Tully district were developed and grassed and cattle fattening extended to this region.

With the potential of this industry becoming evident, preliminary investigations into suitable grass and legume pastures were commenced in 1939. In 1946, more detailed investigations were started and many earlier problems associated with coastal pastures particularly in relation to pasture legumes were solved at the Bureau of Tropical Agriculture.

During the past five years a considerable increase in development has taken place. Higher prices and a more settled market have greatly assisted this development.

Present development

The main areas being developed at present comprise the better class country such as the scrub lands, the lighter scrub adjacent to the river banks, the palm swamp country and the plains.

During 1957-58 an area of some 1,500-2,000 acres of scrub land alone was developed.

The open forest regions are being used for rough grazing during the wet season and provide quite useful feed after the first storms.

Most of these classes of country require their own individual methods of development and pasture mixtures.

Climate

In an area covering such a wide expanse of the tropical coast some variation in rainfall is expected.

A comparison of the average rainfall for various districts from 1948-57 is shown in Table 1.

In spite of a variation of some 100 inches in annual rainfall the distribution of the rain in all centres follows a similar clearly defined pattern of heavy falls in the January to March period, and a dry period in the spring months.

This seasonal variation influences planting times and subsequent pasture growth. An unusual feature of the "wet season" is the extremely hot, dry period of six to seven days, frequently longer, which is often experienced in late January or February.

TABLE 1

RAINFALL [INCHES]

—	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Tully ..	35·7	26·6	32·8	21·9	16·5	9·1	8·9	5·3	4·8	4·9	7·4	11·5	185·4
Innisfail	21·9	21·8	24·0	13·5	7·2	5·0	3·9	3·0	3·6	3·6	5·0	7·6	120·1
Babinda	33·8	21·3	30·7	21·0	9·2	7·5	6·1	8·3	12·6	4·9	12·3	10·0	177·7
Cairns ..	20·7	15·2	17·9	8·5	3·4	2·8	1·5	1·7	2·0	1·6	4·7	6·4	86·4

This dry period with its very high temperatures has an adverse effect on newly planted grasses and has, at times, caused considerable loss.

From the graph in Plate 2, the rainfall distribution can be clearly seen.

At the Bureau of Tropical Agriculture near Innisfail, temperatures vary from the summer average maximum of 86 deg. F. to the winter average of 58 deg. F. with summer and winter extremes of 100 deg. F. and 42 deg. F. respectively.

An indication of the climate throughout the year is gained from

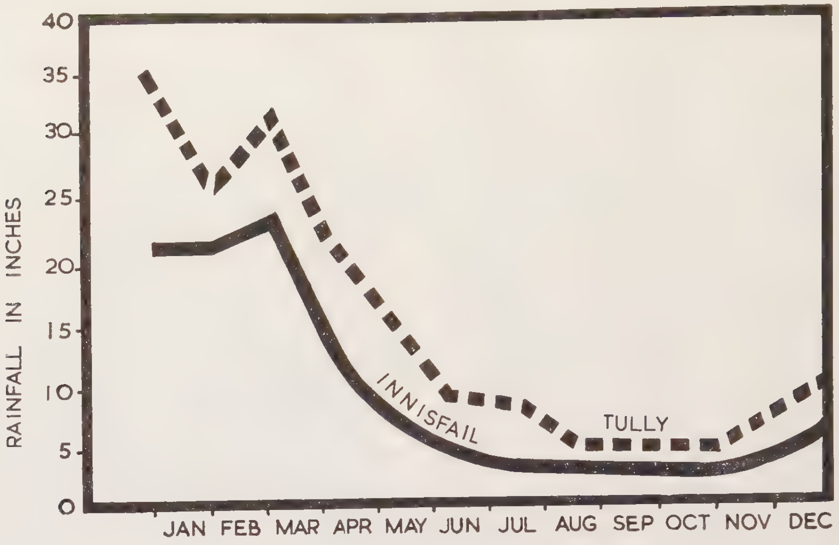

Plate 2

Table 2, which is based on recordings from the Bureau of Tropical Agriculture.

Topography

In portion of this region, pasture is secondary to sugar cane and consequently the grazing areas are on unassigned land and the steeper hillsides in the cane zones. Outside those zones there is some level and plain country being developed under pasture.

The hillsides are, firstly, the foothills with the more gentle slopes and, secondly, the steeper areas of rain forest, which if previously cleared now carry secondary growth and weeds.

Those areas adjacent to the coast are mainly low-lying, subject to flooding and swampy.

Native Vegetation

The native vegetation follows rather definite soil types and topographical zones.

Rain Forest or "Scrub". The Basaltic soils are invariably covered with thick rain forest or "scrub" as it is referred to, typical of so much of the wet belt of the far northern tropical coast.

In addition, a lighter rain forest is also found in narrow strips along many of the rivers and creek banks. These belts vary in width from 2 to 10 chains.

TABLE 2

Climatological Data from the Bureau of Tropical Agriculture (1958)

——	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Average Maximum Temperature °F	87°	86°	85°	80°	78°	75°	74°	76°	79°	83°	86°	87°
Average Minimum Temperature °F	71°	72°	70°	66°	62°	58°	58°	58°	60°	64°	67°	68°
Average Evaporation (daily)	·15in	·13in	·14in	·12in	·10in	·09in	·11in	·11in	·15in	·16in	·17in	·18in
Average Humidity (1958) ..	78%	86%	85%	90%	91%	89%	88%	84%	77%	95%	66%	78%

Soil in these areas is usually a dark grey clay loam (Plate 3).

Cost of clearing of this class of country is high but is somewhat offset by the sale of millable timber. Better pasture stands are usually obtained on this scrub land.

Palm Tree. The Piccabin Palm tree (*Archontophoenix alexandreae*) country is mainly confined to swampy and low-lying areas. It may also be found in conjunction with a light rain forest on some of the lower areas.

In many instances these areas are naturally drained and flooding is usually by "back water" from adjacent rivers or creeks.

Clearing costs are relatively low due to the easy manner in which the palms are pushed over. Costs vary somewhat, depending on the amount of scrub timber and vine which may be mingled with the palm.

This class of country provides good conditions for some species of grass and legumes (Plate 4).

Open Forest. The open forest of the eucalypts, bloodwood, ironbark, and messmate, and similar species is confined to the sandier regions and is typical of many large areas of undeveloped country in the north.

The open forest also varies somewhat in density. It may carry a certain amount of shrub and a vine undergrowth on the better soils with more open timber on the lighter soils (Plate 5).

Clearing costs are comparatively high due to the large trees which have to be dug out and there is usually insufficient material for a satisfactory burn.

Tea-Tree. The tea-tree areas may be broadly divided into two classes. *Firstly,* the better class, which is

Plate 3

Light Scrub Cleared by Bulldozer in the Tully Area

usually found adjacent to scrub fringes on the low-lying areas of the river banks; *secondly,* the poorer group of broad-leaf, stunted tea-tree which is found on the very heavy, white clay soils of the wallum type.

Cost of clearing the better class is fairly low as it is rather open and the trees invariably snap off at ground level when pushed with a bulldozer. However, suckering and seedling growth may be heavy.

grass and various carpet grass species. These all invade neglected areas and pastures.

Establishing Pastures

Sown pastures on the northern tropical coast are usually established on newly cleared scrub or forest areas, or on cleared land which had reverted to weed growth.

Plate 4

Palm Tree and Light Vine Scrub on the Banks of the Tully River.

Native Grasses. Native grasses are found only in the open country, such as the open forest and tea-tree and wattle areas. Species comprise kangaroo grass, a small amount of black spear, giant spear and various *Aristida* and wire grass species. Several small native species of *Brachiaria* are also found on the wetter soils.

In addition to these native species, several other second grade introduced grasses are found in all districts, these being Russell River grass, sour

Land Preparation. Land preparation methods vary greatly depending on whether virgin scrub lands or old cultivations are being developed.

Scrub Lands. Clearing of this country is done either by hand or by machines. In either case small trees and vines are brushed prior to the clearing of the main bulk of the timber.

Hand Clearing. This method involves the chopping and burning of the scrub trees. The tree stumps are left intact and cultivation is impossible for many years unless a bulldozer is used for further clearing.

The average rate of tree-falling by this method, after preliminary brushing has been carried out is approximately 1 acre a day, depending on the thickness of the scrub. Labour for this work is scarce and the cost at present (autumn 1959) varies from £14 to £16 per acre.

Plate 5

Open Eucalypt Forest on Sandy Loam Soil. Carrying kangaroo and black spear grass.

Mechanical Clearing. The use of the bulldozer for clearing land for pasture is a rather recent development in north Queensland, which, providing the heavier type of machine is used, is proving satisfactory. The method is becoming increasingly popular each year particularly on palm and light scrub country where up to an acre an hour may be cleared.

Two methods are commonly used. In one method the trees may be pushed out of the ground and swept into wind-rows about 3 chains apart where they are later burned. This leaves bare strips which are treated as cultivated land on which machinery may be used. Care on the part of the operator is necessary to avoid pushing the top soil with the timber.

With this method, the ash from the burnt trees is concentrated along the wind-rows and the benefit from the plant foods in the ash is lost to most of the area.

With the second method the timber is pushed on a face and the machine is run over the fallen material. After a period of some weeks the whole area is then burned (Plate 6.)

In all cases, clearing should commence early enough to allow the trees and branches to dry sufficiently to be burnt in December.

If commenced too early in the year, sucker regrowth may occur, also the leaves drop and a poor burn results.

Plate 6.

A Good Scrub Burn, 3 Months After Falling. (Note logs and stumps remaining.)

The times of clearing vary from late August-September to early October, depending on the methods and the area involved.

Old Cultivation Land. When bringing old land back into production, it is best to plough early in order to get good control of weeds, particularly if it is an old blady grass paddock. The best kill is gained with most weeds by cultivation during the drier part of the year.

The growing of a leguminous cover crop or forage crop such as cowpeas or velvet beans in the first summer prior to sowing the pasture will help in the control of weeds and provide better soil conditions for the young pasture. This crop is ploughed under in early winter and the weeds kept under control by discing ready for the next December-January planting season.

The plain country being mainly covered with rather dense blady grass should be treated in a similar manner.

Another factor which must be borne in mind is that grass seed is small and unless the soil has been worked into a well firmed seed bed of comparatively fine tilth much seed will be wasted due to its falling on hard lumps, old grass stools, or being locked in large air pockets under the large clods. This frequently occurs in a roughly prepared seed bed.

Treat the grass as a crop and no difficulty will be experienced in obtaining a good stand.

Planting Methods

On uncultivated land the ground conditions such as the presence of logs, stumps and the terrain, limit the use of machinery. Hand broadcasting is chiefly in use.

This may appear to many people to be a rather slow method but after some experience an even spread is quickly obtained.

On cultivated land, seeding may be done by machinery, but to date this has only been carried out in North Queensland by a few farmers.

With very fine small seed, such as molasses grass, the use of sawdust or some other such type of spreader is necessary.

When mixing seed and sawdust the proportions of each must be carefully checked so that an even rate of seed per acre is maintained. A proportion of 2 bags of sawdust to 1 bag of molasses grass has been found satisfactory.

Guinea grass may be sown without sawdust.

When sowing mixed grass-legume seed without sawdust, particularly guinea and centro, the mixture should be kept well stirred, otherwise the centro seed filters to the bottom of the tin and will not be spread evenly throughout the paddock.

When to Plant

It is preferable to sow as soon as fairly continuous rain is assured. This means a December-early-January planting.

Better results are obtained with an early planting, but a risk is attached to very early planting as a hot, dry spell in November may kill young plants and germinating seed.

When planting after a burn, do so as soon as possible, to gain the benefit of the fine seedbed provided by ashes. By burning one day and sowing the next, the seed goes into the ashes and rains ensure that it is covered.

If rain falls between burning and planting, the ash usually cakes. Then the seed is left lying on the surface and germination is often poorer.

On cultivated land, sow when the soil moisture is adequate and follow up rains are assured. Rolling after sowing gives a better germination and more even growth. This is shown by the way the seed germinates better in the wheel tracks left by the tractor.

Some special points to observe when sowing tropical pastures may be summarised as follows:

(1) Order your seed early in the year and have it on hand as you commence to fall.

(2) Buy the seed from reliable sources and avoid introducing weeds.

(3) Plant sufficient seed—a poor stand results in weeds and higher maintenance costs.

(4) If only burning once, plant a legume with your grass to maintain soil fertility.

What Species?

Fortunately the species of grass and legumes do not vary to the same extent as the soil types. The most useful species are described briefly:

Guinea grass (*Panicum maximum* var. *typica*). This grass is widely known throughout the North and is adaptable to a wide range of both climatic and soil conditions. Many strains are found in the guinea species. These range from the very coarse, vigorous giant guinea to the fine, softer green panic.

Common guinea grass is a tall stooling type which if ungrazed may grow up to 8 ft.

Under good management, guinea grass provides a highly nutritious feed practically throughout the whole year. During the wet season, this grass does tend to become high and coarse.

The tropical legume centro combines readily with this grass and forms a very satisfactorily mixed

Plate 7

A Guinea Grass-Centro Pasture Which is 8 Years Old

pasture with the protein averaging about 14 per cent.

A planting rate of 4 to 5 lb. to the acre is recommended (Plate 7).

Green panic (*Panicum maximum* var. *trichoglume*). This strain of guinea is a soft, leafy, fine-stemmed type with a yellowish-green colour. It is not suited to the wet coastal conditions as it has not the ability to recover rapidly after grazing.

During the autumn and winter it is overrun by weeds and poorer grass species. The planting rate is 3 to 4 lb.

Hamil grass. This species is a very vigorous robust strain of guinea grass with a blue-green colour.

From the history available it appears that it was introduced to the Daintree area some 25-30 years ago and has been confined mainly to that district.

Being vigorous, it grows to 12 to 14 ft. and consequently requires additional mowing to control this growth.

It is adaptable to the weedy hillsides and better results are achieved if it is sown in conjunction with the common guinea grass.

When sown as a pure stand, stock frequently have difficulty in making tracks through it and this often results in many areas not being grazed.

A mixture at the rate of 1 lb.–2 lb. of Hamil grass with 3 lb.–4 lb. of common guinea grass to the acre is satisfactory.

Molasses grass (*Melinis minutiflora*). This is a fast-growing species and is particularly suitable for planting in new burns for smothering weed growth.

It will establish itself in soils of lower fertility and is suitable for large areas of the tropical coast. The species is essentially a summer grower and seeds during the autumn. Molasses, in addition to being a valuable pioneer grass, has a place in a tropical pasture programme.

With this grass, however, careless management may reduce its effective value by 90 per cent. It requires careful grazing and will not stand burning.

It is very palatable to stock in the period from the first storms to seeding, at the beginning of May. After it seeds it becomes unpalatable and of only slight value as a pasture grass during the winter and early spring.

Molasses grass combines well with centro for six to seven years but is gradually dominated by it. It is quickly smothered out by the more vigorous puero.

It is sown in early summer—December–January at the rate of 2 to 3 lb. of seed to the acre.

When sown in conjunction with guinea grass, the rate of 1 to 1½ lb. is then used. This combination is useful for sowing in a new burn, the molasses grass being quickly replaced by the guinea after a second burn.

Para grass (*Brachiaria mutica*). This species is ideally suited for the lower flats, wetter areas and the swamp regions of the whole of the coastal belt.

It combines well with centro and will also grow in association with guinea grass. Para, or panicum as it is often called, has a high nutritive value and will stand moderately heavy grazing.

This grass can be either mown or disced, for weed control, without danger to the stand of grass.

When cuttings or runners are planted in rows 3 to 4 ft. apart and 2 to 3 ft. between plants, a quick cover is soon obtained during the wet season.

This species is rapidly overrun with weeds and other grasses if planted on the hillsides, and to a lesser extent on the red soils. Except under very wet conditions, puero will also smother out para grass.

Rhodes grass (*Chloris gayana*). This species also is not suitable for the wetter regions of the coast. The grass rapidly runs to seed and the leaf becomes wiry and unpalatable.

Some stands have been established but usually last one to two years before being overrun with weeds. The planting rate is 8 to 10 lb. to the acre.

Brachiaria decumbens. This grass, which has no recognised common name, is a very vigorous type, dark-green in colour with a rather short leaf. It produces a large amount of bulk with a somewhat coarse, hard and unpalatable stem.

Unfortunately the grass itself is rather low in protein and with a high fibre content. It combines with centro satisfactorily and this helps to raise the protein level. An undesirable feature is that it will invade existing stands of pasture and smother them out.

It will stand heavy stocking and heavy trampling and is an ideal grass to smother weeds.

TABLE 3

Plant	Description of Sample	Analysis of Water-free Material		
		Per cent. Crude Protein	Per cent. Phosphate	Per cent. Crude Fibre
Guinea grass	Young and leafy ..	13·1	·75	25·8
	Old stemmy	4·5	·14	39·7
Figures from Utchee Creek analysis 1956–1958 average all seasons	Grown with Centro ..	12·6	·43	..
	Grown without Centro	9·5	·48	..
Molasses grass	Very young growth ..	11·9	·23	27·4
	After seeding	3·3	·17	40·8
Figures from Utchee Creek analysis average all seasons 1956–1958	Grown with Centro ..	9·1	·39	..
	Grown without Centro	7·1	·45	..
Elephant grass	Young growth ..	21·0	·42	23·2
	Shoots from old growth	7·0	·08	44·1
Brachiaria decumbens	Cut each 90 days ..	4·9	..	..
Green panic	Young growth ..	12·0	·64	27·5
	Old growth	3·4	·63	..
Para grass	Young and leafy ..	24·8	·67	23·2
	Mature growth ..	5·8	·20	38·0

It would prove useful in areas around dairy buildings and yards as it would help to reduce muddy conditions but its tendency to spread from such positions render it a potential weed.

Planting is by rooted cuttings similar to para grass.

Elephant grass (*Pennisetum purpureum*). This species is most useful as a fodder reserve. It will provide a bulk of leaf and stem fairly high in nutritive value.

If ungrazed for long it develops a very hard stalky cane which is unpalatable to stock.

Grazed when it has a good leaf growth, about 2 ft. to 2 ft. 6in. in height, it provides excellent fodder high in protein. Cutting at ground level greatly improves the stand.

This grass is a heavy feeder and requires applications of either farmyard manure or fertilizers for best results.

An ideal position for this grass is immediately below dairy buildings where the washings from the floor and yard manure can be spread over it.

The grass is planted by "sets" in rows 2 ft. 6 in. to 3 ft. 6 in. apart and will grow on quite a variety of soil types.

It also combines well with centro.

Pangola (*Digitaria decumbens*). This strain is not yet in general use, but indications are that it may become a useful species for the wet belt.

The grass spreads by runners and roots from the nodes, similar to para grass.

Present trials show it to be palatable and able to stand fairly heavy stocking. Weed growth is also suppressed.

The results of chemical analysis of some of the grasses are shown in Table 3. The analysis of the grass when grown with a legume clearly shows the increase in protein.

Pasture Mixtures

(*a*) *Red Basaltic Soils.* The red soils dry out very quickly and many grasses are not suited to these conditions.

A mixture of guinea grass and centro is recommended for most of the red soil regions. On the steeper areas, molasses grass may also be included in the mixture with stylo as the legume in place of centro.

Elephant grass in small areas is suitable as a fodder reserve.

Most of the soils on the steep hillsides in the wet belt are low in fertility and are covered with blady grass. A mixture of molasses grass and stylo is recommended for these areas and control of the blady grass is achieved in a few years.

Although para grass grows in some favoured isolated areas, it is not generally recommended for these soils.

(*b*) *Palm Swamps.* Para grass and centro is the most suitable mixture for these areas. It is advisable in the initial planting to oversow with guinea grass at the rate of about 2–3 lb. to the acre. This is a form of insurance to control weed growth until the para grass is firmly established.

In areas subject to inundation, some guinea may die out. On much of the country however, the guinea will continue to grow on the small high mounds and a combination of the two grasses and the legume is soon established.

Centro, although it may be killed by some flooding, can withstand these conditions better than other legumes.

(*c*) *Open forest.* There is a fairly wide range in the class of country under this heading and difficulty is often experienced in establishing grasses. One reason is the high cost of clearing and the difficulty of preparing a seed bed.

The legumes centro and stylo will grow readily, and in combination with native grasses, particularly kangaroo grass, they form quite a good mixture for the wetter months of the year.

However, once the ground has been cleared and prepared, guinea and molasses grass with centro and stylo will grow well on the sandier and lighter ridges. Para grass and centro are suitable for the isolated patches on the lower areas and the heavier soils which may be subject to flooding.

(A summary of the planting rates of desirable mixtures is given in Table 4.)

TABLE 4

——	Planting Rate	Desirable Mixtures
Guinea grass	4–5 lb./acre	Combines well with centro at 2–3 lb./acre
Green panic	3–4 lb./acre	Not recommended for wetter areas
Hamil grass	1–2 lb./acre	Sow with guinea grass at 3–4 lb./acre
Molasses grass	2–3 lb./acre 1 to 1½ lb./acre	Sow with centro at 2–3 lb./acre When sown with guinea grass at 3–4 lb./acre
Rhodes grass	8–10 lb./acre	Not suitable for wetter areas and not generally recommended for the region
Para grass	Cuttings planted at 2–3 ft. in rows 3–4 ft. apart	Sow with centro at 2–3 lb./acre
Brachiaria decumbens	As for para grass	
Elephant grass	As for para grass	
Pangola grass	As for para grass	

(*d*) *Tea-tree.* Molasses grass and para grass, with the legumes centro and stylo will all grow satisfactorily on those areas adjacent to the scrub fringes of the rivers.

Some land preparation prior to sowing is necessary, otherwise the native species are too vigorous and smother out young seedlings before they can become well established.

The stunted broadleaf tea-tree grows on country with a very heavy, white clay soil which is difficult to develop. Heavy applications of fertilizer would be required before a suitable pasture could be established.

Management

Management of pastures in the wet tropics is similar, in the main, to that for other areas. It must be remembered, however, that while pasture growth in the wet tropical regions is very rapid during and immediately after the rainy season, weed growth is equally vigorous.

It is important therefore to allow a new pasture to become well established before grazing so that it may compete with the weeds. Usually the guinea grass will seed in May of the first year of sowing, so do not graze until after this seeding period.

This practice of deferring the grazing improves the stand and may add years to its ultimate life.

Although there is no actual dormant period there is a slowing down of growth during the winter, but with reasonable rains in late Autumn and early Spring growth continues throughout the whole year.

Without a cold winter to check weed growth, winter species such as blue top (*Ageratum sp.*) become quite a problem in many pastures, particularly in molasses grass and in overgrazed areas.

If, however, the pastures are efficiently managed and kept in a vigorous condition, weed growth may be reduced very considerably with little extra expenditure.

Constant overgrazing not only reduces the plant foods stored in the grass roots, but prevents the replacement of those plant foods because insufficient leaves are left on the plants to assist in the manufacture of the important sugars and starches which are essential for further growth.

The height to which pasture plants can be grazed without unduly slowing down their rate of growth depends on the way in which their leaves are produced and carried.

Grass leaves are carried at the nodes or joints on the stems. Where the stems are long and the joints are far apart, as in guinea grass and similar tall, tussocky grasses with rather narrow leaves, there is a relatively small amount of leaf in relation to the height of the plant. This type of grass cannot be grazed too close to the ground without reducing the rate of recovery.

Para grass, on the other hand, has comparatively short internode spaces, and although it has shorter leaves it produces a much greater leaf area in relation to its size. This species, and other grasses of similar growth habit, may be grazed more closely than the stooling types.

Also in a pasture of erect, tussocky grasses, there is a considerable area of bare ground between the stools. If the pasture is overgrazed, competition for light is reduced and weeds soon fill in these bare patches. Species with a prostrate habit and the ability to root from the nodes, form a thicker and denser mat with a more even ground cover.

In the tropics, it is preferable not to graze pastures, particularly guinea grass pastures, below 12 to 15 in. In order to keep pastures to this height, the stocking rate must always be within the safety limits (Plate 8).

Plate 8.

Heavy Weed Growth Resulting from Overgrazing and No Maintenance Work.

Rotational grazing. This form of management is preferable to continuous stocking as it gives the grass an opportunity to recover and stock access to fresh feed at all times.

Where stock are grazed continuously in a larger paddock of mixed pasture, it is quite possible to overgraze the more palatable species while second grade grasses and weeds will take their place. Rotational grazing is specially important when only limited areas of good pasture are available and also to help in the control of ticks.

Rotational grazing, correctly managed, prevents overgrazing and if the stock are moved frequently before the grass is eaten down too low, regrowth is rapid. It is better to graze small areas quickly rather than to prolong grazing on large areas.

Take the cattle from a paddock three days too early rather than one day too late.

Subdivision should be into areas small enough to conform to the herd size and to allow the economic working of the property. Too frequent moving of cattle is not always a practical form of management for beef cattle, and this may occur with very small paddocks.

Mowing. Mowing is a practical means of controlling weeds and pasture growth. However, excessive use of the mower may be as detrimental as overgrazing.

In the early stages of growth, the protein level is high and the fibre content low. As the grass flowers and seeds, growth slows down and the protein level of the leaves falls and the fibre content rises; consequently the grass has inferior quality to when it is growing vigorously.

In order to prolong the growing period, it is necessary to control growth during the flush period and to remove old seed heads and dry stalks.

Mowing is one of the best means of achieving this. However, with vigorous weed growth, mowing must not be too low or too late in the growing season. Legumes are also set back if mown too low.

In other words, mow high, particularly with guinea grass which should not be lower than 15 in., and do not mow after April if possible.

A late mowing means slower regrowth, a lighter carrying capacity and the possibility of increased winter weeds.

Strip Grazing and Electric Fences. The growth habit of tropical pastures limits the use of the electric fence. In addition, the increased stock handling and fence erection limits its use in the grazing areas.

For a satisfactory performance, frequent mowing under the fence line would be necessary to prevent the earthing of the wire.

Stocking rates. The stock numbers should be governed by the driest period of the year, although a greater number may be carried during the wet period.

If it is possible to regulate the stocking rate in this manner, the numbers should be reduced by April to allow regrowth of pasture for the winter period.

However, few graziers or dairy farmers are in a position to vary stock numbers at will and a safe figure to work on for the year round is 1 beast to 3 acres.

The stocking rates vary also with the class of country. Many areas cannot be grazed during the wet season, as trampling damages pastures growing in boggy ground.

The combination of swamps and open forest provides a good association.

Plate 9.

Guinea Grass on Scrub Land being Invaded by Tobacco Bush.

During the wet season the native grass species in the forest provide a fodder of a fairly high nutritional level while grazing is restricted on the wetter areas. This restriction is a form of fodder conservation.

Grazing of the low-lying and swamp areas may be commenced by May, at which period the native pastures are reaching a low point of productivity.

With this combination, stocking may be slightly heavier, even to 1 head to 2 acres when rotational grazing is practiced.

The red basaltic soils do not have the carrying capacity of the heavier regions and the decline of pasture production is most pronounced in May. This lower production is apparent until the storm period of October-November.

If it is considered that a pasture will carry 1 beast to 2½ acres it is better to stock at the rate of 1 beast to 3 acres for safety during the dry months.

Restoration of an overstocked pasture is both slow and costly.

Where fattening rather than breeding is being carried out, it is often practicable to vary the stocking rate in accordance with the seasonal conditions of the pasture.

Weed Control

With a growing season of practically 12 months of the year, weeds become a major problem. Strict control measures are necessary and good management practices required, otherwise weeds very quickly overrun pastures and in some instances may cause stock losses (Plate 9).

The main weeds affecting pasture in the wet tropics are lantana, wild tobacco-tree, devil's fig, knob weed, *sida* species and in some instances guava trees. Blue top is a problem during the winter period.

Agronomic Control. Prevention of weed invasion is far less costly than control once weeds are established. Most of them can be fairly satisfactorily controlled by maintaining a good ground cover throughout the year.

A straight grass pasture is always more susceptible and more open to weed infestation than a mixed pasture. The extra fertility made available to the grass by the legume ensures a good vigorous growth resulting in the exclusion of many weeds.

Chemical Control. Most weeds are susceptible to the hormone sprays, so, for a comparatively low cost, pasture can be kept free from weeds providing they are sprayed as soon as they appear in a paddock (Plate 10).

The main points in maintaining a weed-free pasture may be summarised as follows:

(1) Spray before seeding, when the weeds are young and growing vigorously, and before they are firmly established in a paddock. This means lighter spray applications and greater efficiency in control.

(2) Use the hormone spray at the rate recommended by the manufacturer.

(3) Spray thoroughly.

(4) Remember, legumes are also susceptible to the hormone sprays, so care is necessary when spraying in a mixed pasture.

Mowing or brushing. As mentioned under the paragraph on mowing, good results may be achieved by the judicious use of the mower prior to weed seeding, but follow up sprays are essential. Brushing may be necessary on rough country or where weed size has become excessive.

Plate 10

Tobacco Bush Sprayed with 0.2 Per Cent. Hormone Solution.

Uses for Tropical Pastures

It is considered that cattle fattening offers an effective method of utilizing improved pastures in the wet tropics.

It has been shown over a period of 10 years at the Bureau of Tropical Agriculture that it is possible to fatten 18-month-old steers into high quality fat bullocks in approximately 10 months.

Land clearing, grassing and maintenance costs are high, but well-managed pastures will persist for at least 10 years in a state of high productivity.

There are several methods of utilizing these sown pastures:

Graziers in the breeding country of the Gulf region or the Peninsula could develop their own fattening properties on the coast.

An alternative procedure is for unassigned canelands or other country to be developed by the existing landholders who would buy their store cattle for fattening either from the breeding stations or at central saleyards as at Mareeba. This type of enterprise would be very vulnerable to market fluctuations especially in relation to prices for store cattle.

Group buying by smaller fatteners would help to stabilize the industry and place it on a sound and more profitable basis.

In the localised areas where dairying is carried out on the wet tropical coast, these pastures offer scope for increasing production and prolonging the lactation period.

CHECK YOUR WATERWAYS BEFORE THE SUMMER STORMS

Grassed waterways are important units in the farm soil conservation programme. They are carefully designed to carry excess runoff but to do this effectively they must have a near perfect ground cover and a minimum of top growth. Ensure that these conditions exist at the time the summer storms arrive. Mow in early spring to remove surplus top growth. Apply urea or sulphate of ammonia to ensure a rapid spread of grass in the warmer months and so provide the desired ground cover. —*J. E. LADEWIG, Chief Soil Conservationist.*

Getting The Best From Irrigated Paspalum—White Clover Pastures

By A. NAGLE,
Irrigationist.

Irrigated pastures, composed of paspalum and white clover, are more often tolerated than appreciated by dairymen on the coastal areas of South Queensland.

This is due to the tendency for these pastures to become paspalum dominant during midsummer, with rank unpalatable growth often ergot-infected, while winter production is limited to the white clover component.

With good management practices, the productivity of the pasture and the grass-clover balance can be maintained at a high level, and further, the seasonal productivity can be prolonged well into winter.

The measures suggested for management of irrigated paspalum-white clover pastures are:

(1) *Mowing.* Mowing or "topping" of the dominant paspalum during summer is necessary to improve palatability of the grass, and prevent reduction of the clover stand by excess shading. However, the regrowth is often so rapid that the paspalum is again rank and unpalatable before the next grazing and it is recommended that midsummer mowing be made 6–10 days before the stock are turned in to the pastures.

Mowing before grazing induces a soft nutritious growth of the paspalum, which is then readily acceptable to stock. Therefore, the stock do not concentrate on, and overgraze, the clover as so often happens when the grass is in a rank condition.

Mowing or topping by a rotary-type slasher or mower is quite effective and the clippings can be left on the pastures to form an effective insulation of the clover against midsummer heat. Reduction of soil temperatures in summer is important for vigorous clover growth.

(2) *Deferred Grazing or "Autumn-Saved Pasture."* This involves mowing of a portion of the pasture in early April, allowing the regrowth to stand over until July and August, when a shortage of fresh, nutritious pasture usually occurs. This practice will substantially increase winter production of paspalum-white clover pastures.

This has been proved at the Regional Experiment Station, Gatton, and in New Zealand, where the provision of autumn-saved pasture is widely accepted as a means of extending seasonal production of pastures.

(3) *Renovation.* Renovation with tine or disc implements is required periodically. Renovation reduces the often-sod-bound paspalum stand, allows the introduction of other pasture components rye grass and clover, and improves water penetration and aeration of the soil. It is evident that a thorough renovation every 4 or 5 years will improve production of the pastures. Autumn is the best time for renovation as this allows the oversown rye grass and clover to become established.

Sod Seeding

The autumn introduction of white clover and rye grass into paspalum pastures with a sod seeder also can boost winter production. Close mowing is required before seeding.

Fertilizer Application

On most coastal soils, an annual application of a bag of superphosphate to the acre is necessary to build up the clover stand. It is possible also that moderate applications of nitrogen to the pasture in early autumn and early spring will increase grass production during these critical growth periods.

Poor results from paspalum-white clover are often due to poor management practices. Treat the pastures as a perennial crop rather than a weed-infested field. The productivity and usefulness of the pasture will then be increased tremendously.

Anticipate Summer Irrigation Requirements of Pastures

TOTAL water requirements of irrigated pastures are greatly increased during spring and summer, when more frequent applications of irrigation water are required.

Maintenance of high pasture productivity and persistence of the temperate climate pasture species are dependent on an adequate supply of moisture in the main root zone which extends to a depth of 12 to 15 in.

It is essential that any impending soil moisture shortage should be anticipated and irrigation applied before the occurence of any check to the pasture growth.

Do not depend on the appearance of the pastures as an indication of irrigation need. Plants showing obvious water shortage indicate that watering has been withheld unduly.

Use an earth auger regularly to check the moisture at various soil depths. Irrigate before the moisture in the root zone is depleted.

—*A. NAGLE, Irrigationist.*

Pasture and Crop

Livestock and Soil Fertility.—There is a tradition that keeping of livestock improves the fertility of the land.

Farm fertility can be built up with livestock, for it has been estimated that threequarters of what livestock consume can be returned to the soil in the form of manure.

Though animal droppings are our cheapest form of grass fertilizer, the collection and use of surplus farmyard manure will not always be practicable on every dairy farm.

However, manure harrowing and spreading in the field continues to be an important pasture management practice, which can be readily carried out in conjunction with rotational grazing practices.

—*A. HEGARTY, Agrostologist.*

Don't Delay Irrigation.—Young pastures require sufficient soil moisture to establish a deep root system. Light applications of water either naturally or artificially will cause the pasture components to establish mainly a surface root system.

If natural rainfall has not been sufficient to provide ample soil moisture, action should be taken to provide this moisture artificially. Don't delay irrigation hoping for rain. The shortage of moisture during this period will adversely affect the pasture.

The safest method of establishing whether or not a pasture requires watering is to use a soil auger in the field concerned. If the soil crumbles in the hand, water is required. If the soil forms a ball in the hand sufficient moisture is available.

—*I. N. McCLEMENT, Assistant Adviser in Agriculture.*

Preparing Tobacco Seed-beds.—Soil for tobacco seed-beds should be worked into a fine tilth and then sterilized. After ploughing and cross-ploughing, the land should be cultivated several times before the beds are marked out.

The next stage is sterilization. This is done to kill any harmful organisms that may cause disease and to destroy insect pests, nematodes and weed seeds that may be present in the top soil. Seed-beds may be sterilized to a depth of 4 in. by burning either a layer of wood 1 ft. deep, a 4-in. layer of antbed or a 9-in. layer of sawdust. For best results, the soil should be moist but not saturated at the time of burning. After burning, any unburnt material should be raked off and the ashes worked into the soil. The beds should not be dug over again.

—*E. J. McDONALD, Tobacco Adviser.*

Blue Mould in Tobacco.—Volunteer plants, old stalks, root suckers and old seedbeds are a major disease hazard in all tobacco districts. This growth acts as a reservoir of blue mould infection, and from this source the disease can sweep through the new season's planting.

The Fight Against Disease—1

The Stockowner and the "Micro. Lab."

By G. C. SIMMONS, Senior Bacteriologist

The microbiological laboratory helps the stockowner and the whole community in a number of important ways, which are outlined here:

Australia is fortunate in that it is an island continent, and introduction of disease from abroad can be readily prevented. However, there is no room for complacency, for experience with bovine contagious pleuropneumonia has shown that once a disease is established, eradication may be expensive and time consuming. The quarantine authorities should therefore be given every assistance in applying methods to prevent introduction of diseases.

Our more immediate concern is to determine the causes of ill health in stock within our own country, for it is only when the cause of a disease is known that methods of prevention, control and treatment can be formulated on a sound, scientific basis.

Newspaper and radio publicity given to scientific progress might possibly lead one to believe that all diseases affecting livestock are known. Of course this is not so; in fact, it is only since the Second World War that many of the major diseases have been recognised and their causes determined.

Where Research Begins

Before considering the role of the veterinary microbiological laboratories in this State, a brief summary on how diseases become defined and reported may be of interest. Each disease has its own symptoms and signs but often these characteristics may be very similar in two or more diseases.

An individual stockowner may have a sick animal, or one may die. If he is wise he will call in a veterinarian. Specimens from this animal will then be sent to a diagnostic laboratory if the cause cannot be determined from the post-mortem

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(*Continued from page* 595)

Destroy these unwanted plants and you'll help safeguard your own and your neighbours' crops.

Spores of blue mould are like tiny seeds. They can be carried long distances by the wind. In Queensland, blue mould is by far the most serious disease of tobacco in the field. But co-operation of all farmers in destroying unwanted tobacco plants will greatly reduce the infection. Efficient fumigation of seedbeds is of little value if infected root suckers, volunteer plants and other growth are constantly showering your young plants with fresh spores.

—*A. WINTERTON,*
Agronomist.

examination. Usually a diagnosis can be made when laboratory and field reports are correlated. Occasionally, however, no reason for the ill health can be found.

If a number of such cases occur, then obviously there is a disease of unknown cause which warrants investigation. Within the limits of staff and equipment, special attention is given to it until the cause is determined. The essential points are (1) the disease is reported, (2) field and laboratory investigation reveal an unknown condition, (3) research is carried out on the disease.

It is obvious that if the livestock industry is to know what diseases must be controlled and eradicated, there must be a well-equipped laboratory as part of the industry.

Each country or State must have its own laboratory with staff having knowledge of diseases present in the particular area, for just as animal breeds vary in different parts of the country so often do the diseases affecting those animals. The Queensland laboratories situated at Oonoonba and Yeerongpilly therefore play an important part in determining the diseases present in this State and their relative importance in different regions.

Plate 1

Preparing Media on which Bacteria are Grown.

In Queensland, expansion of laboratory facilities and staffing since the last war has paid dividends, for many diseases previously of unknown cause are known now to be due to specific micro-organisms. Consequently the appropriate control measures or treatment can be taken to prevent further loss.

Strain 19 Vaccine

A good example of the clearer picture we now have of disease problems in Queensland is the situation in regard to infertility in dairy cattle. Infertility has always been a problem in the economic production of dairy and beef products. Vaccination against brucellosis with Strain 19 vaccine has meant that farmers should have only memories, not experiences of contagious abortion storms.

In most herds which have practised Strain 19 vaccination, this has proved the case, but some of the progressive farmers who used the vaccine as soon as it became available found that abortions still occurred in their herds and that infertility was still a problem.

Farmers who sought advice following such occurrence enabled the laboratory to prove that bovine vibriosis was present in Queensland.

Plate 2

Preserving Bacterial Strains by Drying.

The laboratory studied this disease, and with information from other scientific sources, was able to devise a satisfactory test to diagnose its presence in a herd.

Treatment and control methods for this disease are proving increasingly satisfactory and so farmers who now avoid loss from vibriosis should remember those who first asked for assistance and so gave the laboratory the chance to discover the disease.

A similar story may be described for bovine trichomoniasis.

Laboratory workers are always on the lookout for those diseases known to occur in other States or countries. Occasionally they are confronted with a disease in which the cause cannot be surmised just on examination of carcasses or sick animals. Material from such disease is subjected to all the skill and technique possible by the microbiologists.

Sometimes research only serves to eliminate a micro-organism as the possible cause. An example is coastal staggers of horses, now known to be caused by the horses eating a poisonous plant, Gomphrena, although not before a great deal of microbiological examination had been done.

Plate 3

Mouse Inoculation is Frequently Used in Diagnosis of Animal Diseases.

Queensland Discovery

In other instances, microbiological research has revealed an organism not previously described elsewhere. An example we can give is the recognition of *Brucella ovis* as the cause of a genital disease affecting rams. The Queensland work led to the knowledge that this disease was not only important in Queensland but throughout Australia and New Zealand. It is now known to be present in the United States.

Louis Pasteur, who has been called the "Father of Bacteriology," once said that chance only favoured the prepared. There is no doubt this applies to the prevention of loss from disease. If animals or birds die, future losses may rarely be prevented if the cause is not known. If we neglect to obtain an accurate diagnosis, losses will occur in future years, for few infectious diseases die out of their own accord once they become established in a herd or flock.

The diagnosis of disease caused by infectious agents may often be made at least tentatively by examination of the carcass, but usually laboratory examination must be done to confirm or establish a diagnosis. As these infectious agents include many different types of micro-organisms, each having adapted itself to live in a particular host or to a particular mode of life, the modern diagnostic laboratory must have staff with knowledge of each organism and the equipment necessary to isolate and study them.

A microbiological laboratory is expensive to equip, staff and maintain. Newer techniques to isolate and study disease organisms call for even more expensive apparatus. The days are gone when a microscope and test tube were all the equipment needed. Even the microscope required is much more expensive.

Where is the Gain?

Quite rightly then the question may be asked, "What does the stockowner and the general public gain from having such laboratories?"

Out of the numerous answers that can be given, we may list the following—

(1) Diagnosis of disease.

(2) Diagnostic facilities in case of introduction of diseases from abroad.

(3) Research on diseases to devise vaccines, diagnostic methods and control methods.

(4) Recognition of diseases transmissible from animal to man.

(5) Research on the proper handling of food products.

The microbiological laboratory staff have reason to consider each of these items important to the whole community in producing animal products as economically as possible. Also, that the best use of laboratory facilities will only occur if all persons in, and associated with, the stock industries work together.

Stock and Station

Feeding the Pig.—The overfat pig can be avoided! The bacon pig with the heavy, soft backline, rolls of fat along the ribs and flanks, and the deep, barrel-shaped underline, dresses into a carcass which is difficult to sell because of its excessive proportion of fat to lean. This undesirable carcass can be avoided by regulating the food intake. When pigs reach porker weight, restrict the intake of grain and allow the animals to satisfy their appetites with bulky foods like pasture or hay. Feed a nutritious ration while the pigs are growing to porker weight so that the muscle or lean can develop fully. Such feeding practices lead to the production of prime grade carcasses.

It must be realized that, irrespective of the pig's shape, it is in the farmer's feeding methods that prime carcasses are produced.

—*G. W. OSBALDISTON,*
Pig Branch.

Fatten Lambs Quickly.—On fat lamb farms, it is very desirable to fatten lambs for market as quickly as possible. Generally, under most favourable feed conditions for the ewe, and crop conditions for the lamb if lambs have to be weaned, the time period for the lamb to reach a good market weight will be 3 to 4½ months. Such lambs should have received no setback to their growth in this time. By marketing time, they should be well rounded off, with a short dumpy body, thick shoulders, broad back, and with wethers, a good cod. Many Downs farmers include portable weighing scales of the clockface type in their farm equipment. These are useful for determining lamb weights in yards. It is necessary to have a reasonably close knowledge of the range of weights required in market lambs, and to check weights of lines of lambs as they progress to see if they have attained those weights. The greater proportion of desirable export prime lamb in Australia lies in a range of weights around 28 to 36 lb.

Queensland's lamb kill is all used for home consumption. As lambs around that range of weights appear to receive the best prices at Queensland sales, it is reasonable to assume that that is the type required by butchers and housewives. To secure carcass weights ranging from 28 to 36 lb., paddock lambs would need to be within a range of approximately 55 to 75 lb. when fresh in from the paddock.

Buyers bidding for fat lamb on the hoof do not weigh the lambs, but assess the carcass weight from general experience. They value the line of lamb according to primeness, evenness of line, and make an allowance for bruising and transport stress. They go by visual appraisal, touch, long experience, and knowledge of current market values.

Early maturing is the main factor to aim for in fat lamb preparation for market. Breeding and feeding both go towards such results. Breeding lays down the foundation or potential for optimum development. Good feeding of the ewe during late pregnancy and during lactation is equally essential if the potential of the lamb to grow into a quickly matured and high-market-value lamb is to be realised. Care should be taken during the growth of the lamb to see that neither the mother nor the lamb is handicapped by worms.

Lambs marketed early make the least demands on the available pasture, crops, and stored fodder on the property; and permit early release of the mothers to allow for preparation for the ensuing season's mating and pregnancy.

—R. B. YOUNG,
Senior Adviser in Sheep and Wool.

Pink-eye in Horses.—If neglected, pink-eye can cause complete or partial blindness in horses. Pink-eye is an infectious inflammatory disease that may affect one or both eyes.

Affected horses should be stabled in a dark stall, as their eyes become very sensitive to light. Their eyes should then be treated several times a day with an antibiotic ointment. Early treatment gives the best results.

If the disease has developed to a more serious stage, it's best to call in a veterinary surgeon. But if this can't be arranged, use eyedrops with some cutting action, such as 2 per cent. zinc sulphate or three to five drops of 5 per cent. silver nitrate solution. Alternate with this treatment an antibiotic or antiseptic preparation, preferably one containing cortisone.

—S. KNOTT,
Divisional Veterinary Officer

Keep Pleuro in Check.—Queensland cattlemen are getting on top of pleuro, but only regular inoculation will keep the disease down.

Extensive inoculation programmes have sharply reduced the number of pleuro cases reported. In fact, fewer than 1 per cent. of slaughter cattle from most properties have shown evidence of pleuro in the last year or two. Five or six years ago, meatworks' reports often indicated that up to 15 per cent. of cattle slaughtered showed evidence of pleuro.

Although the position is encouraging, pleuro is still present. Any relaxation in herd vaccination is merely inviting trouble. Don't miss vaccinating your young stock every year. Combined with the vaccination of all older cattle every two or three years, this is a good insurance against future outbreaks.

—K. M. GRANT,
Assistant Director of Veterinary Services.

Poultry Beginners Need More Than Luck.—Lately, the Poultry Section of the Department of Agriculture and Stock has had a large number of inquiries from people wishing to start poultry farming. In many cases, people have been under the impression that only a limited amount of capital is needed to start a poultry farm, and that a good living can be made from a flock of 1,000 layers. This may have been true 10 years ago, but it isn't the case today. Poultry farming is becoming a specialized business and the income which the farmer earns depends largely on his efficiency and management.

If you intend making poultry farming your business, you will need a flock of at least 2,000 layers to provide you with a good income by present day standards. To establish a farm of this size from scratch, you will need at least £5,000 of available capital. In addition you will be paying out for feed, without any return, during the five months needed to rear your pullets. Then, for the next two months, farm costs may exceed egg returns because the pullets are still coming into lay and egg size is small. This means that you may need a further £1,000 working capital to tide you over this seven-month period.

—R. V. BYRNES, Poultry Branch.

Best Prices for Eggs.—It is essential that a commercial egg producer understands and tries to operate the law of supply and demand to his best advantage. Naturally the demand, or consumption, of eggs tends to remain at a fixed level throughout the year, but the supply varies according to the seasons and consequently so does the price. When the supply of eggs is greatest the prices are low and when the supply is poor, then egg prices are high.

From our Egg Marketing Board figures, we find that production is greatest from September to January inclusive and prices are relatively low. While from February to June inclusive, production or supply is lowest and egg prices are highest. February to June then is the period to concentrate on and is the time when we want the pullets to be laying most heavily.

In order to have pullets laying well during this period, it is necessary to purchase chickens in late July or during August. These chickens will come into lay in late January or early February and continue to lay right through the year till the following February–March when they will go into the moult. In other words, they dodge the first moult.

The late July–August chickens may not lay more eggs over the laying year than, say, May hatched chickens, but they produce at the right time and are therefore more profitable.

—K. D. PUGH,
Poultry Officer.

Timely Tips For October

October can be a month of dry weather and storms. Given dry weather and scanty pasture, animals may eat plants which they would not otherwise touch. Also, storms may bring on a flush of plants which might be relished by hungry stock. Plant poisonings are likely under both these conditions. Generally, treatment for plant poisoning in stock is symptomatic. If you suspect trouble from this source, contack your nearest veterinary officer. He will advise on treatment and determine what plant is involved, so that you may be able to eradicate the plant.

Warts in young stock may be seen this month. They can be treated by surgery or a drug injection. The same drug is used in the treatment of "lumpy jaw."

Remember that "lumpy jaw" is infectious. An animal with an open "lump" is a danger to the rest of the herd.

You may see vaginitis in your herd this month. If it is "simple" vaginitis, douches with ½ per cent. zinc sulphate or powders with zinc sulphate as a base may be worthwhile. If the vaginitis is "secondary" and the main site of infection is in the breeding bag, it is a good idea to have the herd investigated to find out what the real cause is. Then it can be treated.

Don't let mange keep your pigs back. Departmental trials have shown that mangy pigs eat well but don't grow so well as mange-free pigs. (In fact, mangy pigs hardly grow at all.) Thorough treatment of all pigs on the farm with BHC twice within 10 days will prevent trouble from this source.

* * *

● *Prepare your land for early summer crops.*

Brucellosis-Tested Swine Herds (As at 1st September, 1959)

Berkshire

Astbury, "Rangvilla", Pechey
Clarke, E. J., Mt. Alford, via Boonah
Cochrane, S., "Stanroy", Felton
Cook, F. R. J., Middle Creek, Pomona
Crawley, R. A., Rockthorpe, Linthorpe
Edwards, C. E., "Spring Valley" Stud, Kingaroy
Farm Home For Boys, Westbrook
Fletcher, A. C., "Myola" Stud, Jimbour
French, A., "Wilson Park", Pittsworth
Grayson, D. G., Killarney
H. M. State Farm, Numinbah
H. M. State Farm, "Palen" Stud, Palen Creek
Handley, J. L., "Meadow Vale", Lockyer
James, I. M. (Mrs.) "Kenmore" Stud, Cambooya
Kimber, E. R., Block 11, Mundubbera
Law, D. T., "Rossvill" Stud, Aspley
Lees, J. C., "Bridge View" Stud, Yandina
Ludwig & Sons, A. R., "Beau View" Stud, Beaudesert
McLennan, G. J., "Murcott" Stud, Willowvale
O'Brien & Hichey, J., "Kildurham" Stud, Jandowae East
Orange, L. P., "Hillview", Flagstone Creek
Pfrunder, P. L., Pozieres
Pick, L., Mulgildie
Potter, A. J., "Woodlands", Inglewood
Puschmann, L., "Tayfield" Stud, Taylor
Q.A.H.S. & College, Lawes
Regional Experiment Station, Hermitage
Rosenberger, N., "Nevrose", Wyreema
Schellback, B. A., "Redvilla" Stud, Kingaroy
Smythe, E. F., "Grandmere" Stud, Manyung, Murgon
Stark, H. L., "Florinda" Stud, Kalbar
Thomas & Sons, F., "Rosevale" Stud, Laravale
Traves, G., "Wynwood" Stud, Oakey
Weier, V. F., "La Crescent", Clifton
Wolski, A., "Carramana", Warra
Young (Jnr)., W., Kybong, via Gympie

Large White

Assenbruck, C., Mundubbera
Barron Bros., "Chiltern Hill", Cooyar
Bell & Son, E. J., "Dorne", Chinchilla
Butcher, Dr. B. J. & Parnwell (Mrs.), Plunkett, via Tamborine
Clark, L. D., Greens Creek, Gympie
Duncan, C. P., "Hillview", Flagstone Creek
Fowler, S., "Kenstan", Pittsworth
Franke, H. J., "Delvue" Stud, Cawdor
Garrawin Stud Farm Pty. Ltd., 657 Sandgate Rd., Clayfield
Gibbons, A. E. H., Mt. Glorious
Gibson, H., "Thistleton" Stud, Maleny
H. M. State Farm, Numinbah
Hall, M., "Milena" Stud, D'Aguilar
Heading, J. A., "Highfields", Murgon
Horton, C. J., "Mannuem Brae" Stud, Mannuem, Kingaroy
Hutton, G., "Grajea" Stud, Cabarlah
Jensen, S., Rosevale, via Rosewood
Jones, K. B., "Cefn" Stud, Clifton
Kahler, J. & S., East Nanango
Kanowski, A., "Exton", Pechey
Kennard, R. B., "Collar" Stud, Warwick
Larsen, H. L., "Oakway" Stud, Kingaroy
Law, D. T., "Rossvill" Stud, Aspley
Lees, J. C., "Bridge View", Yandina
Lobegeiger, L. C., "Bremer Valley" Stud, Moorang, via Rosewood
Mack, A. J., Mundubbera
Palmer, A., "Remlap", Greenmount
Pampling, G., Watch Box Road, Goomeri
Postle, R., "Yaralla" Stud, Pittsworth
Powell, R. S., "Kybong", Gympie
Q.A.H.S. & College, Lawes
Radel, V. V., Coalstoun Lakes
Regional Experiment Station, Biloela
Robinson, O. R., & O. J., "Linvale", Argoon, Biloela
Skyring, G. I., "Bellwood" Stud, via Goomeri
Stanton, H. R., "Tansey" Stud, via Goomeri
Stewart, L., Mulgowie, via Laidley
Stumer, K. F., French's Creek, Boonah
Wharton, C. A., "Central Burnett" Stud, Gayndah
Wieland, L. C. & E., Lower Cressbrook, Toogoolawah
Zahnow, W., Rosevale, via Rosewood

Tamworth

Armstrong, H. J., "Alhambra", Crownthorpe, Murgon
Booth, J. D., Swan Creek, Warwick
Campbell, P. V., "Lawnhill" Stud, Lamington
Coller, R. H., Tallegalla, via Rosewood
Fletcher, A. C., "Myola" Stud, Jimbour
Herbst, L. "Hillbanside", Bahr Scrub, Beenleigh
Kajewski, W., "Glenroy" Stud, Glencoe
Kanowski, S. E., "Miecho", Pinelands
Potter, N. R., "Actonvale" Stud, Willcamp
Regional Experiment Station, Kairi
Salvation Army Training Home For Boys, "Canaan" Stud, Riverview
Skerman, D. F. L., "Waverley", Kaimkillenbun
Stephens, T., "Withcott" Stud, Helidon
Thomas & Sons, F., "Rosevale" Stud, Laravale
Wieland, L. C. & E., Lower Cressbrook, Toogoolawah

Wessex Saddleback

Ashwell, J., "Green Hill", Felton South
Burnett, G. C., "Rathburnie" Stud, Linville
Cooper, G. J., Neumgua
Douglas, W., "Greylight" Stud, Goombungee
Dunlop, J. B., "Kunawyn", Acacia Road, Kuraby
Kruger & Sons, "Greyhurst" Stud, Goombungee
Law, D. T., "Rossvill" Stud, Aspley
Mack, A. J., Mundubbera
Scott, A., Wanstead Stud, Grantham
Smith, C. R., "Belton Park", Nara
"Wattledale" Stud, 432 Beenleigh Road, Sunnybank

Large Black

Pointon E., Goomburra

So You Want To Go Poultry Farming?

By C. W. TUTT,
Poultry Adviser.

There always are some questions the newcomer to any business wants answered. Apart from technical ones, there are the ones relating to COSTS and PROFITS.

Poultry farming is no exception. Attracted by high prices for eggs, people at present outside the industry are showing renewed interest in poultry farming as a business.

Capital Resources

The person concerned knows how much capital he has available to "put into" or "buy into" a poultry farm. If he is going to "put into" a poultry farm, and plans to build it up from a largely undeveloped piece of land over a period of time, he should know to within a very near figure, the amount it is going to cost him—and the profits he can expect.

If he buys a poultry farm as a going concern it is of value to him to know the capital he would require if he built, equipped and stocked a new poultry farm.

To the prospective poultry farmer in both of these categories therefore, the following figures based on present day costs will be of interest:

1. Satisfactory housing and equipment can be expected to cost £1 8s. for each layer.

2. Capital required to house 1,000 layers satisfactorily is £1,400.

3. Stock can be reared to the point of lay for 12s. each.

4. Capital required to rear 1,000 pullets is £600.

5. £2,000 is therefore required for a farm unit of 1,000 layers.

6. Working capital to the extent of £1,000 would be desirable to tide the new farmer over the period when the farm is being developed and therefore unproductive.

Earning Power

Pullets can be expected to earn more than hens for they generally lay at a greater intensity than hens.

"Pullets" can be defined as adult female fowls which have not completed a year's lay. Hens, or second year hens as they are called in the industry, are those which have completed a year's lay, and have moulted. Pullets in present Queensland flocks can be expected to lay an average 168 to 180 eggs a year. Second year hens can be expected to lay between 120 and 132 eggs each in a year.

Thus it can readily be seen that pullets are more profitable than hens. On comparable rations second year hens eat at least 2 lb. more feed for every dozen eggs produced than pullets.

Besides the marked difference of overall earning power between the second year hens and pullets, as shown by their production figures, profitability of either is considerably affected by the time of the year when much of the production takes place. It is more profitable to produce eggs when egg prices are higher. On the basis of average annual production and average annual net return for eggs, it is expected that a pullet will earn £1 4s. 9½d. at the present time.

Egg Price Is Not All Profit

With "hen" eggs retailing at 6s. 6d. a dozen in southern Queensland (4-6-59), poultry farming may appeal as an easy-money field to the newcomer entering the industry.

But there are expenses! A breakdown of the selling price reveals:—

8d. a dozen goes in the retailers' margin.

1s. 0½d. a dozen goes in deductions made by the Egg Marketing Board.

2s. 8½d. a dozen is devoured by the costs of production.

A total of 4s. 5d. that is *NOT* profit.

The profit margin is 2s. 1d. a dozen. It should be appreciated the average profit per dozen eggs throughout a year is not so much. The average price paid for first quality hen eggs through 1958 was 60.26d. a dozen. The average deduction was 6.51d. a dozen. The average payment to producers was 4s. 5¾d. a dozen. The cost of production was 2s. 8½d. a dozen. The average net profit was 1s. 9¼d. a dozen.

The Cost

Feed accounts for 75 to 80 per cent. of the total costs of producing eggs. The amount of feed required by pullets to produce a dozen eggs on an average ration is 7 lb. Through 1958, layers' mash cost 3¾d. a pound and so represented

Plate 1

These Young People are Looking at an Intensive Laying Shed, the Type Required for Successful Intensive Poultry Farming.

2s 2¼d. in the cost of a dozen eggs. Any upward or downward movement in the price of poultry feed is quite important to the poultry farmer, as each ½d. a lb. represents 3½d. on a dozen eggs, equal to 4s. 1d. a layer a year.

Plate 2

On the Inside of this Intensive Laying Shed are Feeding Hoppers which Prevent Feed Wastage. There is plenty of perching space and four inches of loose, dry litter. Also in use is a handy, multi-purpose farm cart.

Other costs besides feed are freight, depreciation on housing and equipment, stock replacement loss, labour, and interest on capital. These, excluding labour, total 6¼d. a dozen.

This cost is very variable, depending on the efficiency of the farm, and no attempt to assess its value in the cost of production is made here. The newcomer to poultry farming may like to regard payment for his labour as part of the profit of poultry farming.

Good Husbandry is Essential

Experiments and experience have both shown there is no satisfactory substitute for good husbandry. There is no short cut, nor cheap way of building up a sound poultry farming business.

Good buildings and equipment and adequate accommodation make for convenience of working, and these are a necessity to enable the would be poultry farmer to care for a sufficiently large flock to return him a good living.

Flock Size

"How many layers do I require to make a good living?", the newcomer invariably asks. "About 1,500", is the round figure answer at the present time. An ALL PULLET flock of this number, properly looked after, should return you about £1,860 profit.

Egg prices vary from year to year, depending on the demand of available markets and the supplies

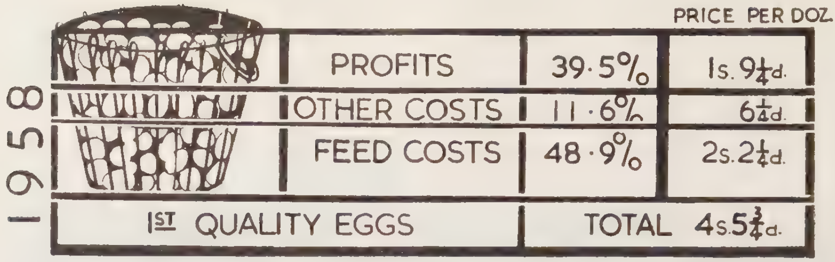


Plate 3

Showing the Return from First Quality Eggs in 1958.

of eggs available to meet it. In addition, seasonal variations influence the supply of grains and meatmeals available which have a very important influence on the cost of production. Both of these largely determine the profit margin.

In south-eastern Queensland and central Queensland, all producers keeping 50 or more fowls are required to market their eggs through the Egg Marketing Board. Approved producers are granted permits by the Egg Marketing Board to sell eggs direct to customers. Every holder of a permit is required to furnish monthly returns of all eggs sold to the Egg Marketing Board and pay such levies as the Board may require. At present (4-6-59) these levies amount to 7½d. a dozen.

Farm Site and Buildings

A large proportion of Queensland poultry farms are situated in and near the Greater Brisbane area. An advantage these farms enjoy is their proximity to the main Queensland market for poultry products.

Future expansion may well be mainly outside this area owing to the "building in" of many suitable areas by residential expansion. This factor should be evaluated by those contemplating the establishment of a new poultry farm.

Brisbane Area

Brisbane City Council ordinances in respect to poultry farms require the following:

(1) Plans and specifications of all structures to be submitted to, and approved by the Building Surveyor.

(2) The site upon which poultry sheds and other buildings are to be erected to be approved by the Health Inspector.

(3) The poultry sheds and/or any concrete floor or floors of like material to be made rat-proof.

(4) All poultry to be kept at least 200 ft. from any dwelling or habitable building.

(5) All poultry to be kept at least 100 ft. from any natural watercourse or roadway.

Poultry farming is a job requiring attention seven days a week. It has its disappointments and its rewards. It's up to you to make your appraisal, of the *costs* and *profits*. If you want to go poultry farming make sure that you have taken a close look at those figures which mean success or failure in any venture—*costs*!

* * *

Pigs Poisoned By White Cedar Berries

By S. G. KNOTT and P. D. RANBY,

Veterinary Officers.

If you have white cedar trees in your pig or poultry pens, either destroy the trees or remove the pens to another site. The berries from these trees often cause losses of pigs and sometimes of poultry too.

Loss of pigs from eating white cedar berries was seen recently. One morning in June, a farmer at Camp Mountain found sickness and deaths (see Plate 2) amongst a litter of nine piglets. The piglets were one month old and had been thriving. Post mortem examination of the four dead piglets revealed large numbers of yellow, egg-shaped berries in their stomachs. The three sick piglets showed a wobbly gait when walking but preferred to lie down. Two of these died several days later.

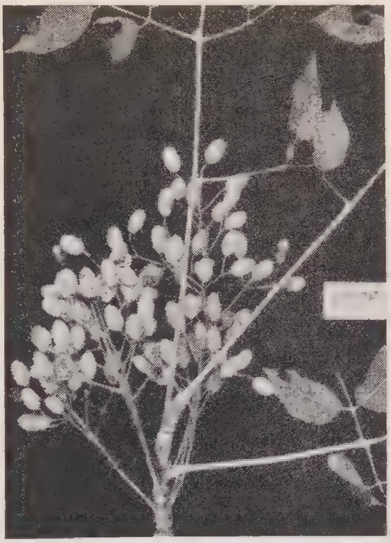


Plate 1

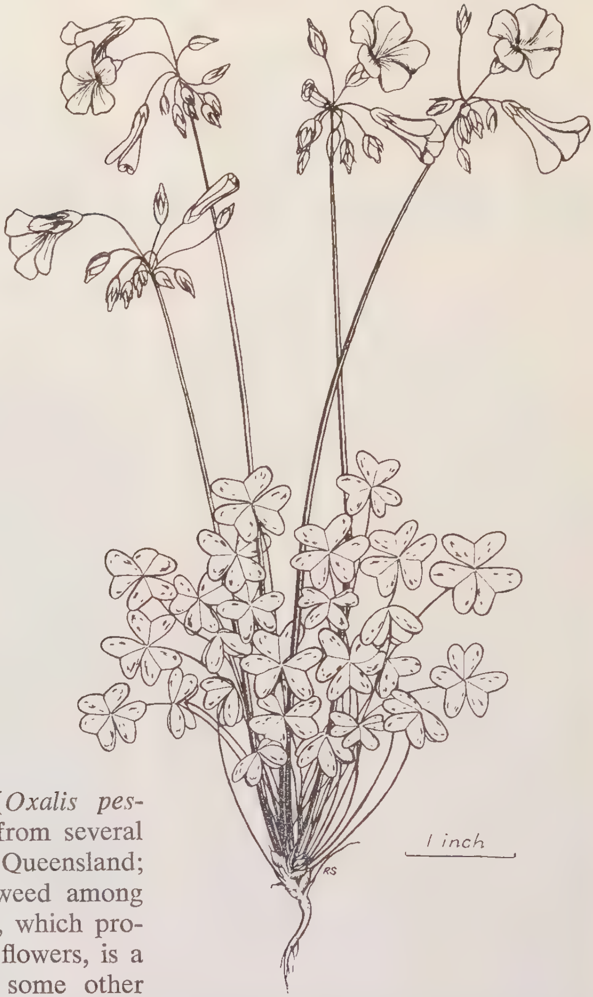
A Typical Cluster of White Cedar Berries.

Plate 2

These Suckling Pigs Died From Eating the Berries of the White Cedar.

Soursob Declared Noxious Weed

By S. L. EVERIST,
Government
Botanist.



Recently, soursob (*Oxalis pes-caprae*) was reported from several localities in southern Queensland; in one instance as a weed among pineapples. The plant, which produces attractive yellow flowers, is a very serious weed in some other

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(*Continued from page* 609)

The young pigs but not the sow were able to leave and enter the sty through a small opening. A white cedar tree loaded with berries was found 50 yards away and many berries had fallen to the ground.

Over the years, losses have been reported from most areas where white cedar trees grow. Young suckling pigs that have escaped from their pens and gone searching for extra food, have been reported to be killed by white cedar berries.

Outbreaks are more likely in pigs than other domestic animals.

In cases of poisoning from white cedar berries, the farmer usually reports sudden deaths and illness in pigs that have been thriving. Sick pigs stagger about and show signs of abdominal pain and prostration. In addition, they may also pant and show bluish gums—both signs of interference with blood oxygenation. The berries may also cause patchy bowel inflamation and lung congestion although these changes are not always present.

There is no specific antidote for the poison but it is wise to give affected pigs a purge as soon as possible.

States, particularly South Australia. Although there is no certainty that it will become so aggressive here, recently it was declared noxious under the Stock Routes and Rural Lands Protection Acts as a precautionary measure.

The plant has a perennial rootstock, swollen here and there into white, fleshy tubers, and producing numerous bulbs and bulbils. There is no stem above ground, numerous leaves arising directly from the crown of the rootstock.

The leaf consists of a long, yellowish green, fleshy stalk, and three clover-like, wedgeshaped leaflets, notched at the tip and resembling the traditional shamrock; each leaflet is usually marked with purple spots and all have the power of folding up or "going to sleep".

Stems and leaves have a sharp, acid flavour.

The flowers are on slender stalks in clusters of about 16 at the top of upright stalks longer than the leaves; the 5 petals are bright yellow and about 1 in. long.

Ripe seeds are rarely produced in Australia, and the plant spreads by means of the bulbils, which are easily detached from the parent and are carried about on implements, boots or the feet of animals.

In Queensland, soursob has been found growing wild in a few places on the Darling Downs, West Moreton and the near North Coast. Ocassionally it is grown in gardens.

The plant contains oxalates in fair quantity, and has killed numbers of sheep in other States, mostly when the animals were hungry and low in condition.

How to Get Rid of It

Those who have it, should get rid of it before it spreads. This can be done by mixing sodium chlorate with water at the rate of 1 lb. to 4 gal., and spraying the plants until they are wet. At this low concentration, there is not much residual effect on the soil, and most grasses will recover.

Solutions of ordinary sodium chlorate should be used with care because if these solutions are allowed to dry out on boots or clothing, they can take fire if rubbed or struck. Proprietary preparations are available which contain extra chemicals to reduce this fire risk. These are mostly only half the strength of powdered sodium chlorate and should be mixed accordingly.

* * *

Book on South-Eastern Queensland Flora

Although compiled in the first place for beekeepers, *The Honey Flora of South-Eastern Queensland* has a use for farmers and others interested in botany. It contains illustrations and descriptions of the important ironbarks, gums, bloodwoods, boxes, stringybarks, wattles, tea-trees, and cultivated plants such as lucerne, pumpkins, oranges and clover.

The Honey Flora of South-Eastern Queensland contains 199 pages and 178 illustrations. Prices are: In Queensland 15s. a copy, with a 3s. discount to registered apiarists, University botany students and booksellers; elsewhere £1 a copy.

The Way To Grow Parsnips

By C. N. MORGAN,
Senior Adviser in Horticulture.

Successful growers of parsnips are specialists, who use methods as recommended here.

The parsnip (*Pastinaca sativa*) is a native of the Mediterranean region. It has never become an important commercial crop in Queensland, possibly because the demand is restricted to consumers who appreciate the rather distinctive flavour of the roots. The plant is somewhat fragile in the early stages of growth and production is more or less confined to specialist growers who are not deterred from planting by the need for thorough land preparation and careful attention to details.

Land Preparation

Any well-drained soil of reasonable depth can be used for parsnips but growers show a preference for the light sandy loams. On the heavier soils, the preparation of a fine seedbed involves the use of rippers, chisel ploughs or deep cultivators before the soil can be brought to a fine tilth.

Thorough pre-planting tillage is essential. The soil must be free from lumps, stones and trash, all of which interfere with the downward penetration of the developing root. Such mechanical obstacles are responsible not only for uneven germination but also for much of the rough skin and forking characteristics which sometimes show up in roots at harvesting.

On the lighter types of soil, single row plantings on the "flat" are normal. In many vegetable-growing areas, however, the soil type is a friable clay-loam, sometimes of shallow depth. On such soils, the crop is planted on beds raised some 6 in. above the general ground level, and the required surface tilth is obtained with a scraper board which breaks up clods liable to interfere with planting operations. The beds are usually about 3 ft. centre to centre, and about 2 ft. wide, which is sufficient to carry two rows of parsnips.

Plate 1

Young Parsnip Crop in the Sunnybank District. The soil is a deep, sandy loam and the crop has been established on the "flat" in single rows.

Soil Fumigation

Parsnips are very susceptible to attacks by root-knot nematodes, which cause unsightly lumps on the roots and reduce keeping quality after harvesting.

In areas where nematode damage has been experienced the soil should be fumigated with DD or EDB (12½ or 15 per cent. v/v) at least two weeks before planting. These liquid fumigants are injected into the soil through flexible hoses attached to tine implements in rows one foot apart at a depth of 6 to 8 in. The rate of application is ¼ pint per chain of row (20 gal. to the acre). For good results the soil must be in seed-bed condition and should be compacted with a medium-weight roller immediately afterwards. Watering to wet the surface inch of soil after treatment helps to increase control in the surface layer of the soil.

Nutrition

Most of the coastal soils in Queensland are moderately to highly acid. The parsnip has a high lime requirement and marked responses to applied lime have been recorded on a number of occasions. A soil pH of not less than 6.0 is considered desirable for the crop. In most vegetable growing areas, it is difficult to maintain a pH of this order, particularly in the heavier rainfall areas. An application of lime or dolomite to land which is to be used for parsnip growing is therefore generally desirable.

Rates of application will vary with the acidity and texture of the soil. On the heavier soils, they may range from 1–2 tons to the acre and on the lighter soils, from ½–1½tons to the acre. Either lime or dolomite may be used but the latter should be applied if magnesium deficiency symptoms have been recorded previously in crops grown in the area. Both may be broadcast over the surface of the ground in the final stages of land preparation and then cultivated in.

The parsnip crop makes heavy demands on the nutrients of the soil. Manures are sometimes applied before planting, but they must be thoroughly decomposed as raw organic matter in the soil tends to induce malformation of the roots. Rates of application vary from 5 to 10 tons to the acre. Supplies of manure are, however, limited and most parsnip growers rely entirely on artificial fertilizers to produce the crop.

The standard fertilizer is a 5/13/5 mixture. It is available in two forms, one of which contains a considerable proportion of blood and bone while the other is wholly water-soluble. The first of these is used in the basal dressing at the rate of 8–10 cwt. to the acre. It may be broadcast over the land in the later stages of land preparation or, alternatively, distributed along the bottom and sides of furrows in the row positions when the land is almost ready for planting. The former practice is generally preferable as high concentrations of fertilizer near the developing root of the young plant increase the risk of forking, especially if rainfall is sub-normal and water supplies for irrigation are limited.

Where the previous crop in the rotation has been heavily fertilized, and the residual nutrients are in good supply, rates of application for the basal fertilizer can be substantially reduced.

Side dressing fertilizers are normally required shortly after thinning and again four weeks later. In this case, a soluble 5/13/5 mixture is used at a rate of 1½–2 cwt. to the acre. The fertilizer is banded along both sides of the parsnip row and chipped in. Times of application and rate of application may, of course, be varied according to the growth behaviour of the crop.

Planting

Only one parsnip variety—Hollow Crown—is grown commercially in Queensland. The roots are large and well-shaped and yields are high.

With plantings on the flat, row spacings vary from 15 to 18 in., depending on the implements used for cultivation. On raised beds, however, the two rows are 12 to 15 in. apart.

The seed is sown at a rate of 4–6 lb. to the acre or approximately ¼ oz. to 100 ft. of row. The normal depth of sowing is from ½ to ¾ in., and precision planting is necessary to ensure even germination. The best results are obtained when a mechanical planter is used on a firm seed-bed. Such planters are usually fitted with a roller which packs the soil after the seed is sown. When the seed is hand planted, the seed-bed should be immediately rolled and irrigated.

On some soil types, the surface tends to cake when irrigated and the crust interferes with germination. Any such crust which appears on the ground between sowing and germination should be broken up with a fork hoe or by running a small spiked roller over the rows.

Only new seed should be used for planting. Parsnip seed loses its viability very quickly; old seed invariably germinates irregularly and gives an uneven stand, both of which create difficulties in handling the crop later on.

The parsnip is a long-season crop and takes from 5 to 6 months to mature. In coastal areas, successional plantings are made from late February to May. In the cooler upland districts, earlier planting is permissible. Late plantings are rarely successful; root quality is inferior and, in any case, the consumer demand for parsnips declines rapidly in the warmer months of the year.

Weedicides

In parsnips, as in carrot crops, weeds can be controlled with white spirit and power kerosene, both of which are selective weedicides.

The normal practice is to spray the parsnip row about 10 days after planting and before germination takes place. Usually a heavy crop of weeds develops before the germinating parsnips appear above ground. The pre-emergence spray destroys these weeds and ensures that young seedlings do not encounter excessive competition. The second spray is usually applied about three weeks later, when the plants are in the fern-leaf stage.

With this schedule, little or no hand weeding is necessary. Weeds developing between the rows are, of course, controlled with tillage implements.

Certain precautions are necessary when weedicides are used after the parsnips have germinated. The spray should be applied as a fine mist in sufficient quantity to wet the weeds without excess run-off onto the soil. In addition, applications should be restricted to the late afternoon when temperatures are falling and the leaves are dry; morning applications involve a risk of injury to the plant.

Thinning

Given a reasonably good germination, the seedlings will be packed close together in the row and, if unthinned, the roots develop slowly and a considerable proportion may be small and possibly malformed. In commercial practice, thinning is essential.

This operation is usually carried out by hand some three to four weeks after germination, when the seedlings are just large enough to handle. The job is done by hand and the best of the young plants are retained to give an average spacing between the plants of approximately 3 in. Thinning operations are simplified if a scuffler with specially adjusted tines is run alongside each row to leave the young plants on a ridge about 2 in. thick.

After thinning, the soil should be compacted by irrigation.

Harvesting and Marketing

Parsnips are harvested when the roots are 1½ to 2 in. in diameter at the crown. There is a limited trade for bunch roots, each bunch comprising 12 roots with the tops on. The bulk of the crop is, however, marketed in bags containing topped roots which are graded for size. The normal grade standards are—No. 1 grade: sound, well-shaped roots not less than 2 in. in diameter and 6 in. in length; No. 2 grade: sound, well-shaped roots not excessively shrivelled and not less than 1½ in. in diameter and not less than 4 in. in length. Deformed, cracked or diseased roots should never be consigned to market.

The roots may be pulled in light-textured soils but it is more usual to dig them carefully with a fork in order to avoid damage. Pulling is more or less restricted to the lighter soil types. A plough furrow may be opened-up alongside the row to make pulling easier. After pulling, the roots are topped about ½ in. above the crown, washed and bagged.

Men engaged in harvesting parsnips sometimes suffer from skin complaints characterised by painful blisters on the neck and arms. Individuals differ in their susceptibility to the complaint, and there is some evidence that the trouble is more pronounced when the crop is harvested wet than when harvested dry.

Points to Remember

1. **Prepare the seed-bed at least 12 in. deep.**
2. **Fumigate before planting in land with a nematode history.**
3. **Lime the soil when necessary, and fertilize heavily except in the more fertile soils.**
4. **Use new seed and sow it in firm ground.**
5. **Control weeds early in the life of the crop.**

Plate 2

Parsnips Bagged for Market. The roots must be graded for size and quality.

* * *

Orchard and Garden

Kelthane Controls Red Spiders on Strawberries.—Red spiders are troublesome on strawberries during each spring in Queensland and control of these pests has been a particular worry to growers because of the limited range of suitable miticides available for use. Entomologists in this State have, over a number of years, conducted extensive investigations with likely materials in an endeavour to obtain one or more showing a high degree of control combined with a low health hazard. Kelthane, a new organic miticide has these features and is recommended especially for use on strawberries. It should be used at a strength of 0.05 per cent. active ingredient at intervals of two weeks during periods of attacks. As with any material of this kind, it is necessary to give a thorough cover to the under leaf surface, and applications should be spaced a few days before fruit picking.

—A. R. BRIMBLECOMBE,
Senior Entomologist.

Market Only Top Quality Beans.—Only high quality beans, picked at the right stage of maturity, will secure top market prices. But they should also be well packed, as bad handling and packing can easily reduce your returns.

The best stage for picking beans is when the pods have ceased to grow any longer. The seeds will then be about a quarter of an inch long. If beans are left on the plant for too long, the seeds continue to grow after picking and the pods become stringy. If they're picked too young, they will wilt quickly.

Beans should be picked every three or four days. After picking, cases or bags should be held in a cool place. Cases must be stacked on their sides to allow for the bulge of the lids. To prevent the lower layers being crushed, bagged beans should not be stacked too high.

—K. KING,
Senior Adviser in Horticulture.

Avocadoes Are Touchy.—So you're thinking of planting avocadoes? Yes! The trees are attractive, and the fruit has a glamour all its own.

Assuming that you have the warm, frost-free area which is preferable for these trees—there are yet two major limiting factors which you must consider and investigate.

These are the depth and drainage of your soil. I don't know of any other fruit tree that is more easily damaged or killed by excessive soil water, which causes root rots and leads to disease attacks.

Most fruits will tolerate fairly wet conditions for a week or more. Three days of waterlogging, however, and avocadoes will give up the ghost!

The soil must be deep and friable —well-drained to a depth of 4 or 5 ft., or more if possible. Don't take chances; be certain!

Get a soil auger and sample the area deeply in a number of places. Watch out for changes in colour and texture. Colour changes in the profile often indicate drainage trouble; mottling with blue and white streaks are a sure indication. A clay subsoil or hardpan, of course, rules out the soil type immediately.

You can't afford not to be certain; the avocado is definitely one tree that just won't stand wet-feet!

—D. DOWDLES,
Horticulture Branch.

The job of guiding a club

By J. PARK, State Organiser,
Junior Farmers' Organisation.

JUNIOR farmers' clubs, like all voluntary youth organisations, need competent guidance. At the club or "grass roots" level this can best be given by members of the advisory committee. These committee members must understand the club and know how to help it without taking initiative and authority away from the members. The advisers should be experienced people to whom the club members can turn for help and advice. Because they are experienced, the advisers have something valuable to offer: advice. But giving advice is a delicate matter. It is easy to offer too much, and equally easy to offer it the wrong way.

Composition of Committee

It is not possible to lay down rules for the composition of the club advisory committee. The needs of individual clubs in this regard differ widely, and the availability of suitable advisers is equally variable.

It is generally accepted, however, that the members of the committee should be mature persons older in years than the club members. It should contain people of different vocations and from different walks of life. In the interests of the girls in the club, women should be represented as well as men. If representatives of local organisations are on the committee, the club can be linked to these in ways helpful to both.

The number of advisers will not be the same in all clubs but will vary according to the size of the club and to the frequency of its meetings. A large club with a varied programme and a number of active groups which meet often will make greater demands upon its advisory committee than a smaller one or one which meets less often.

The size of the committee is, however, a less important consideration than the personalities of its members.

Election

In a club's first year, the advisory committee is often the small group of people who sponsored the club. Thereafter, the advisory committee is elected annually by the club members. Before a nomination is made, the person concerned must be asked and must agree to stand for election. Naturally the voting will be by secret ballot and not a show of hands. Retiring members are eligible for re-election but this does not mean that the committee shall be elected en bloc as an easy way of disposing of the business. The election of advisers should be taken seriously both by those who have been nominated and by those who will cast the votes.

It is not unusual to find that an advisory committee member may seldom attend meetings and may take little real interest in the club. Where politeness discourages the club members from "dropping" such a person from their list of nominees, a hint from his fellow advisers that he might consider not standing for election again would not be out of place.

Meetings

As well as attending club gatherings, the advisory committee may find it desirable, if not necessary, to meet informally to discuss club affairs. It is advisable also that occasional meetings between the advisers and the club executive be held. All meetings of the advisory committee should have some specific purpose, for example, to consider the progress being made by the club, or to discuss the suggestions which are to be made to the club by the committee concerning its programme. While all such meetings of the advisory committee will be informal, it is essential that a record of all the meetings should be kept. For this reason, if for no other, it may be advisable for the committee to have a chairman and a secretary.

Duties of Committee

The first duty of every adviser is to know what a junior farmers' club is for, and how it can help the young people of the community. This knowledge comes from living in the locality and being in close touch with its people; from learning what other clubs are doing; and from a study of the *Junior Farmers' Handbook,* which may be obtained free of cost upon application. The committee must understand particularly well the organisation of the club itself and appreciate its relationship with the zone council and the State council. Unless they do this, they cannot set an example—as they should—of willingness to co-operate with the zone and State bodies. This information can be gained not only from the official *Handbook* but also from such people as the organising staff members and the local State councillors.

(TO BE CONTINUED)

HINTS FOR CLUB MEMBERS

Don't try to push inexperienced members into a debating team. To debate well requires self-confidence as well as skill. Make a start with discussion groups using familiar topics; conduct mock meetings with all members speaking to motions which lend themselves to friendly argument. Finally, encourage members to give short talks.

* * *

Standardised Bale Markings

JULY to September is the greatest peak period for Queensland sheep shearings. About 40 per cent. of Queensland's sheep are shorn in these months.

The Australian Wool Bureau scheme for standardised bale markings is becoming increasingly used by sheepmen in all States. Wool clips branded with standard bale markings define the *standards* of wool for each particular property; not the *qualities*. If bales are branded with standard markings the broker knows easily which is the best wool of any particular clip. Similarly, the buyer knows which wool to turn to immediately, when he is looking for the top line. Where standardised markings are not used it is often the case that each bale has to be opened up and examined on the broker's floor.

Brochures relative to implementing standardised bale marking are obtainable from your local Sheep and Wool Officer.

—R. B. YOUNG, Senior Adviser, Sheep and Wool Branch.

Try These Tomato Recipes . . ..

As a vitamin C rich food, tomatoes are among the best. One good-sized, vine-ripened tomato will give you about half your day's quota of vitamin C, as well as a generous amount of vitamin A.

To get most good from tomatoes, eat them raw and fresh. But remember they hold a large share of their vitamins even when cooked or canned.

Tomato Tips

- Sort and use ripest tomatoes first. Keep the rest spread out where it's cool . . . the refrigerator is a good place.
- Peel and cut tomatoes quickly, just before you are ready to cook them or serve raw in salad. If you must prepare tomatoes ahead of time, be sure to keep them covered in a cold place until you use them.
- To peel tomatoes.

Stroke the skin with the back of a knife until loosened, or

Dip in hot water 1 to 2 min., then quickly into cold-water, or

Run tip of fork into tomato and rotate over a flame until the skin wrinkles slightly.

Green tomatoes, caught by the first light frost, can be brought indoors. "Mature greens"—those about to turn colour and often with a white spot around the blossom end—will ripen at cool room temperatures (55 to 70 deg. F.) in either sunlight or shade. Spread them out.

Immature green tomatoes won't ripen and are likely to rot if kept too long. It's best to pickle or cook them soon after picking.

Fried Tomatoes

Slice 6 medium-sized ripe or green tomatoes about ½ in. thick. Dip in mixture of ½ cup fine, dry bread crumbs or flour, ½ teaspoon salt, and a little pepper. Cook in a small amount of fat until brown on both sides. If desired, dip tomatoes in beaten egg, then in flour or bread crumbs before cooking. Six servings.

Scalloped Tomatoes

3½ cups sliced tomatoes
¼ cup minced onion
2 tablespoons minced green pepper, if desired
1 teaspoon salt
Pepper
Sugar, if desired—½ teaspoon for ripe tomatoes, 1 tablespoon for green
2 cups soft bread crumbs
2 tablespoons fat

Combine tomatoes (ripe or green), onion, green pepper, salt, pepper, and sugar if used. Place in a baking dish alternate layers of tomato mixture and bread crumbs, ending with bread crumbs. (For a thinner mixture, omit 1 cup of the crumbs). Dot with fat.

Bake in a moderately hot oven (375 deg. F.) 20 to 30 min. for ripe tomatoes, about 45 for green.

If desired, sprinkle ½ cup grated cheese over the top for the last 10 to 15 min. of baking. Six servings.

Baked Tomatoes

Wash and remove stem ends of 6 medium-sized tomatoes, ripe or green. Place in a baking dish, brush with melted fat, and sprinkle with salt and pepper. Add just enough hot water to cover bottom of dish. Bake in a moderately hot oven (375 deg. F.) until tender—about 30 minutes for ripe tomatoes, about 45 for green. If desired, sprinkle with bread crumbs before baking.

On the half shell.—Cut tomatoes in two, place cut side up in a baking dish, brush with melted fat, and season with salt and pepper. Bake in a moderately hot oven (375 deg. F.) until tender—about 30 min.

Stuffed.—Scoop out centre of ripe tomatoes, leaving a shell about ¼ in. thick. Chop pulp and drain off juice (use juice in cocktails, soups, sauces). Mix pulp with an equal amount of soft bread crumbs. Add 2 tablespoons minced onion cooked in 1 tablespoon fat until lightly browned. Season with salt and pepper. Stuff tomatoes, and place in a greased baking dish; add just enough water to cover bottom of dish. Bake in a moderately hot oven (375 deg. F.) until tender—25 to 30 min.

Beef, Tomato, & Cabbage Scallop

1 pound ground beef or other lean meat
2 tablespoons fat
¼ cup chopped onion
1 cup chopped celery
2½ cups tomatoes
2 teaspoons salt
Pepper
4 cups chopped or coarsely shredded cabbage
1 cup soft bread crumbs

Brown the meat in fat. Add onion and celery; cook 5 min. Add tomatoes, salt, and pepper; bring to boiling. Place alternate layers of cabbage and meat mixture in a baking dish. Top with bread crumbs. Bake in a moderately hot oven (375 deg. F.) 40 to 45 min. Six servings.

Fish-Tomato Stew

Cook 3 cups cubed potatoes in 3 tablespoons fat until lightly browned. Add ½ cup chopped onion, ¼ cup chopped green pepper, 3½ cups tomatoes. Cover and cook until potatoes are tender. Add 1 pound cooked fish, cut in about 2-in. pieces. Season with 1 teaspoon salt, and pepper. Cook about 5 min. longer. Six servings.

Chicken Creole

4- to 5-pound chicken
¼ cup flour
1 teaspoon salt
Pepper
¼ teaspoon paprika
¼ cup fat (chicken fat may be used)
½ cup chopped onion
½ cup water
¼ cup chopped green pepper
2½ cups fresh tomatoes

Cut chicken into serving pieces. Roll in mixture of the flour, salt, pepper, and paprika. Brown in melted fat. Add onion; cook 2 to 3 min. Add the water, cover, and simmer about 1 hour or until almost tender, adding more water if necessary. Stir occasionally to keep from sticking. Add green pepper and tomatoes. Simmer about 30 min. longer. Serve on seasoned hot noodles or rice. Six servings.

Savory Rice With Tomatoes

Cook ¼ pound diced bacon until crisp, remove from fat, and drain. Combine 2 tablespoons of the bacon drippings with 3½ cups tomatoes, ¼ cup each of chopped green pepper and onion. Bring to boiling, add about 3 cups cooked rice, cook 10 to 20 min. Or add 1 cup uncooked rice and 2 cups water, and cook gently 40 to 45 min. or until rice is tender. Add more water if mixture becomes dry. Season with salt and pepper. Add bacon. Six servings.

Clear Tomato Soup

1½ quarts tomatoes
½ bay leaf
¼ cup chopped onion
4 cloves
1 tablespoon fat, melted
1 tablespoon flour
1 teaspoon sugar, if desired
1 teaspoon salt
Pepper

Cook together the tomatoes, bay leaf, onion, and cloves—about 20 min. Press through a sieve. Blend the fat, flour, and sugar (if used); gradually add the cooled, sieved tomatoes. Cook over low heat, stirring constantly for about 5 min. Season with salt and pepper. If desired, sprinkle with finely chopped parsley and serve with toasted bread cubes. Six servings.

Spanish Sauce

Cook 2 tablespoons chopped onion in 2 tablespoons fat until lightly browned. Blend in 1 tablespoon flour. Add 2½ cups tomatoes, ½ cup each of chopped celery and green pepper, 1 tablespoon chopped parsley, 1 teaspoon salt, and a little pepper. Cook 15 to 20 min., stirring frequently. Serve over meat loaf, cooked spaghetti, fried or baked fish, cooked cabbage, or omelette.

◆

V-Belt Care Reduces Wear

Designers of modern farm machinery are turning more and more to V-belt drives in preference to chain and sprocket and flat belt drives. While it is true that V-belts provide a comparatively slip-free and shock-absorbing drive, it is nevertheless essential that they should be used under conditions recommended by the manufacturers, and given adequate maintenance so that they do not fail prematurely.

As most of the stretch in V-belts occurs within the first few hours of operation, the tension should be checked two or three times after short periods of running. The degree of tension needed will depend upon a number of factors such as the section, the size of the pulleys, the speed and the load. An approximate check can be made by measuring the deflection of the belt midway between the shaft centres. This should be about ¾ in. on an average drive.

If a belt which has seen some service requires frequent tensioning, it is a sure sign that its useful life is coming to an end, so keep a replacement ready.

If one belt of a multiple drive fails, the whole set should be renewed. It is a great mistake to use belts of different ages and makes in a multiple drive. Store the serviceable belts carefully against the time when a used set can be matched and put into use together. Belts are best stored away from direct sunlight in a cool place. They should be hung in single or triple coils and not too tightly wound. Tying them tightly with thin string or wire should be avoided.

Never use belt dressing on V-belts—if you do, slipping is bound to occur. Also do not allow oil or solvents to come into contact with them as these attack the rubber.

Last and by no means least, never fit a new belt by forcing it over the pulley with a lever—always slacken off the adjustment fully and fit the belt by hand.

—*C. G. WRAGGE, Agricultural Engineer.*

Science tells us why and how to use valuable milk food

AT one time milk was regarded as necessary for only babies and young children. Today's scientific knowledge shows it to be a food of such exceptional value that no diet, at any age level, is complete without it.

Why so important?

Milk supplies more of our needs than any other one food. It is an energy food, a body-building food and a protective food.

Though a liquid, milk has more solid matter than apples, turnips and other fruits and vegetables.

Milk contains these food elements:

Proteins—(For growth and tissue repair).—Casein, Lactalbumin, Lactoglobulin.

Fats and Carbohydrates—(For energy and warmth).—Butterfat, Milk sugar or lactose.

Minerals—(For building bones and teeth).—Calcium Phosphorus.

Vitamins—(For normal body function).—A, B1, B2, C, D, and nicotine acid.

Children Must Have Milk

A building is only as good as the materials that go into it. The same applies to the human body. And the building time is the growing time. Bones are lengthening and calcifying; teeth are developing; young muscles are developing to meet the demands made on them. Milk's first-class proteins and minerals provide the ideal answer to these needs. As a "grow-food", milk is a "must" in every child's diet.

Milk for Adults

Without milk the average adult diet would seriously lack calcium. That is why milk is essential, as the most practical and pleasant way of getting the calcium the body needs.

Adults need at least half a pint of milk a day, as a drink or in cooked foods.

Milk and Weight

Milk can help both to reduce and to gain weight. A glass of milk taken about 20 minutes before a meal will dull the appetite for the more fattening foods at the table. When an increase in weight is desired, doctors prescribe milk sipped slowly with or just after a meal.

Mother Needs Milk

Milk is especially important in the diet of both expectant and nursing mothers. The mother must nourish her baby both before and after birth. She needs an extra supply of body-building elements and minerals for the bones and teeth of the developing baby. Otherwise nature will rob the mother's body for the sake of the child. The nursing mother has equal need of at least a pint of milk a day.

Milk Must Be Safe

Disease germs can thrive and multiply in raw milk for long periods. So pasteurised milk should be used where possible. The modern process of pasteurisation destroys bacteria, but does not alter the quality and flavour of the milk. If only raw milk is available, or if it is preferred, boil it before use. Both raw and pasteurised milk should be boiled before being given to baby.

Care of Milk at Home

Pasteurised milk is delivered to your door safely sealed in sterile bottles. From then on, the safety and quality of the milk are in your hands. Exposure to sun is bad for milk, as it destroys some of the vitamin content. Arrange for the bottles to be left in a shaded spot, and then, as soon as possible after delivery, put the bottles in ice chest or refrigerator. Use the milk from its own bottle and cover with its own cap.

Some Ways of Serving Milk

As a drink, coloured and flavoured. As a drink with coffee, chocolate and other beverages.

With eggs in custards, baked or boiled.

As blanc mange, flavoured and coloured.

As junket or milk jelly.

In souffles, flummeries and other cooked milk dishes.

Creamed with vegetables.

Served with porridge and cereals.

How Much Milk You Need

Children—not less than one pint daily.

Adults—not less than half pint daily.

Expectant and Nursing Mothers—certainly not less than one pint, and, if possible one quart daily.—*Queensland Health Education Council.*

Solving The Underweight Problem

WHEREAS overweight is more dangerous in people of middle age and older, underweight is more a matter for concern in people under thirty. Underweight is more often a symptom of disease than is overweight, but of itself is a far less dangerous and distressing condition.

What Causes Underweight?

It may be a sign of disease, especially if the loss of weight is sudden. More often, underweight is caused through habitually eating too little food or the wrong kind of food; by fatigue or over-activity; or by psychological factors such as worry and mental strain.

There is quite a large class of apparently normal persons who seem unable to gain weight. However, careful examination of their mode of living usually shows that one or more of the above named factors are involved. Many teenagers, keen to remain slender, allow their weight to reach a dangerously low level, at an age when underweight is especially hazardous.

Plan for the Underweight

1. Have a thorough medical examination to decide whether or not the underweight is caused by disease.
2. Get plenty of rest at night and during the day when possible, so

that fatigue will not interfere with appetite or the body's ability to use food to build body weight. Underweights should try to get 9 or 10 hours' sleep a night. If it is at all possible, a short rest should be taken after each meal.

3. Do all you can to avoid hurried eating and stress and strain during meals. An ample, unhurried breakfast is particularly important in overcoming underweight.

4. Eat well-balanced meals at regular times. Ask your doctor during the initial examination if he suggests any extras in the way of diet. Milk, sipped slowly with or after meals, can be helpful in gaining weight.

5. Take moderate, regular exercise, suited to your individual needs, but don't continue to the point of undue fatigue.

6. Above all, try not to be a worrier. Do your best to cultivate a calmer and more relaxed attitude towards life. Try to build up a hobby and other interests to keep your thoughts pleasantly occupied.—*Queensland Health Education Council.*

A few shillings may save you pounds

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Big Milk Output From Historic Dairy Farm

By W. D. MITCHELL,
Dairy Technologist.

A property which in 1912 was one of the major suppliers of milk to Brisbane is, today, under new management, still providing milk to this expanding city market. This farm on the banks of the Brisbane River at Wacol, only 12 miles from the city, has a rich historical association with development of the State and the dairying industry of the district.

Under the management of Mr. R. M. Hurley, summer milk production from the 117 acres of the farm has increased from a daily output of 40 gal. in 1956 to a winter production of 80 to 100 gal. daily in June, 1959. Only milk is supplied from this farm, 68 gal. being paid for at ruling market milk prices, the remainder being sold as manufacture milk.

At present, farm income is being supplemented with cash crops of pumpkins and potatoes.

Plate 1

Original Farm Homestead Built in the 1840's on the Banks of the Brisbane River at Wacol. Showing the Hand-Hewn Sandstone Roof Supports. The additional brick wing was added at the turn of the century.

Plate 2

Portion of the Farm Buildings Erected in 1912. The brick pig sties are in the left foreground and the remains of the grain silos in the rear. The right-hand portion shows the present-day feeding stalls.

Dates Back to 1842

The early records of this property date back to 1842 when Dr. Simpson, an early Government official who was to become the first Commissioner for Lands in the Moreton Bay district, was granted 6,000 acres of land from the Government. The original homestead, Wolston House, built by convict labour in sandstone blocks 18 inches square, is being used by the present-day owners. The floor timbers of these original buildings were adzed and the nails handmade. Only in the last year, the men's barracks have been modernised to provide accommodation for Mr. Hurley's son-in-law, who, together with Mr. N. Hurley, assists in working the property.

The major development in dairying took place at the turn of the century when, in 1907, the property was passed to the Grindle family. Evidence of their appreciation of sound management remains today.

The original dairy bails are still standing and today are being used as feeding stalls. These old bails provided for feeding during milking, feed being obtained from three brick silos in adjoining buildings. A derelict set of scales found by Mr. Hurley suggests that feed was being accurately dispensed and the most use made of fodder reserves. This brick and timber building contains four 15,000 gal. underground concrete water storage tanks, no doubt for use for drinking and cleansing purposes. The remaining portion of the buildings comprised holding yards and brick pig sties. The useful portions of these early buildings, including the feeding stalls, are illustrated in Plate 2.

Farm Layout

The total area of the farm comprises 117 acres consisting of 40 acres of rich river flat together with cleared undulating scrub country. At present the area is sub-divided into nine permanent paddocks which provide for cropping with lucerne, oats, potatoes and pumpkins and areas of native grazing pastures. The cultivated area occupies some 36 acres.

To obtain the most favourable feeding value from lucerne and oat crops, the electric fence is extensively used to further sub-divide the river flats during grazing periods.

Herd Management

Since commencing operations in 1956, a gradual alteration in the number and quality of stock has been made. Initially, the herd consisted of 66 Friesian cows which were used primarily to produce vealers for the meat trade, together with small quantities of milk and cream for local sale. To transfer to cream and then milk, Mr. Hurley has gradually changed the composition of the herd through the introduction of a pure bred Jersey bull, several pure bred Jersey and grade A.I.S. cows. A herd of 50-60 cows is now being milked.

To ensure efficient production and to indicate which are the best females from which to breed replacements, the herd is being production recorded under the Grade Herd Recording Scheme of the Department of Agriculture and Stock.

Testing under this scheme was commenced in September, 1958. At the present time, in the initial stages of development, replacement stock have been purchased until sufficient high-producing heifers are bred into the herd.

This practice, however, can be expensive, and with the present high prices obtainable for export beef the owner has found it necessary to buy these cows at abnormally high prices.

This season the first seven heifers mated to the pure bred sire, Trinity Banners Richmond, will come into production. Next season the full programme of providing seven calves each year to ensure five replacements animals will be introduced. To achieve this Mr. Hurley has provided a special bull paddock, and in this manner controls matings.

Feeding

Strict attention is paid to feeding of all milking stock to obtain the best return from the animals.

As the quantity of output receiving the market milk price ("quota" milk) is related to the low production winter months, this attention to high all-the-year production pays dividends. Grain feeding of the herd is provided in the feeding stalls mentioned earlier. The level of feeding is determined on the following basis which has been found to give practical results—

(*a*) *Jersey Cows.* A minimum level of 13-14 lb. of milk a day is set for the introduction of supplementary feeding. Cows achieving this standard are fed at the rate of 2 lb. of crushed grain at each milking, and those below this level are not supplementary fed.

(*b*) *A.I.S. Cows.* With this breed the minimum production level for feeding is 17-18 lb. of milk. Feed with this larger breed is at the rate of 4 lb. of crushed grain to each milking.

The grain used in the last season was crushed milo which was purchased in bulk lots to minimise costs.

The main basis of judging the worth of the milking animals is herd recording information. However, to assist with feeding programmes during the monthly intervals between test periods, a Metrilac Flow Recorder is used to indicate the amount of milk flowing up the milk down-dropper into the sight bowl. Constant reference to the quantities measured on this recorder ensures best use of grain feeding.

Pumpkins have been fed to all milking animals each season. These are sliced and fed in the stalls together with the crushed grain or lucerne hay. An area of 4 acres of Beaudesert Blue variety provided adequate feed during the winter of 1959, a slight surplus being disposed of on the vegetable market. In its role as a bulk crop to back up the supply of dry winter pastures, this carbohydrate food is making a valuable contribution to winter production.

Cropping Programme

To provide ample feed during the milking life of the herd, areas of lucerne and oats have been established. Seventeen acres of lucerne are at present under cultivation on the river flats. This area has been gradually increased from an initial 6 acres in 1957 and present plans are to further increase the acreage to a maximum of 33.

Spray irrigation of lucerne is a regular practice, and during the dry period of May to July each year approximately 280 points are applied every three weeks. Fortunately the salt tolerance of lucerne has meant there is an unlimited supply of water for irrigation.

Being situated on the Brisbane River, water is pumped directly from the river and only in dry times does the salt content cause concern. To date, however, no detrimental effect has been experienced with lucerne.

Power for pumping is supplied by the tractor and a 12,000 gal. an hour pump used to feed the "monsoon" spray lines used for dispersion of the water. Last season, nine cuts and grazing were obtained from the lucerne area. When adequate natural feed is available on the remainder of the farm, the lucerne is cut and converted to hay for feeding out in the stalls during later months.

Bloat from young lucerne growth has not so far been a problem. To overcome this hazard, however, cows are grazed in the following pattern—Grazing for 10 minutes on the lucerne area, then removal to native pastures for 3 to 4 hours; return to the lucerne for a further 15 minutes, and then returned to the native pastures for a second spell; finally the young lucerne is grazed for a further period of 20 minutes.

Oats also provide a useful supplement during the low production winter period and 15 acres are at present available for grazing. The sowing rate was 45 lb. of Benton and Bovah oats to the acre, plus an additional seeding of 9 lb. of tares or Dun field pea to improve the protein content of the feed. In the winter of 1958, the then 10 acres of oats provided 4 grazings for 30 milking cows using the electric fence to ensure most favourable grazing.

Dairy Buildings

Realising that modern facilities are a valuable aid to top quality production, Mr. Hurley erected new dairy buildings in May, 1958, under the supervision of the local Dairy Officer, Mr. J. Jacobsen, to coincide with the change-over to the supply of market milk. The bails are constructed of tubular steel and the ideal circumstances provided by these buildings are illustrated in Plate 3. Facilities in the milk room include a 10-gal. hot water boiler, an external 10-gal. wood copper and a 10-can cabinet-type dairy refrigerator with an associated tubular cooler for shock cooling during milking.

In-place cleaning of milking machines using an acid-alkali recirculation technique has ensured satisfactory cleanliness of all metal equipment. The results of random examinations for thermoduric type bacteria in milk supplied from this farm to the Brisbane market indicate that satisfactory results are being obtained with the cleaning methods. Excessive numbers of these bacteria show undesirable deposits of milk stone on equipment.

Sample Date	Thermoduric Bacteria
7–5–58 ..	Greater than 100,000/cc.
22–7–58 ..	Less than 30,000/cc.
13–10–58 ..	Less than 10,000/cc.
12–1–59 ..	Less than 10,000/cc.

(A bacterial count of 30,000/cc. is accepted as a satisfactory standard.)

Measures adopted to control mastitis in the herd have much to recommend them. All udders are washed with a chlorine solution before the machines are attached. The milk from each quarter is checked for visible signs of mastitis, using the strip-cup. Before the cows leave the bails the udder is again washed with a chlorine solution. This is claimed to seal the teat orifice with a chlorine solution to minimise after-infection. When cows dry off, it is the practice to insert a penicillin stick into each teat before putting the cows into the dry paddock.

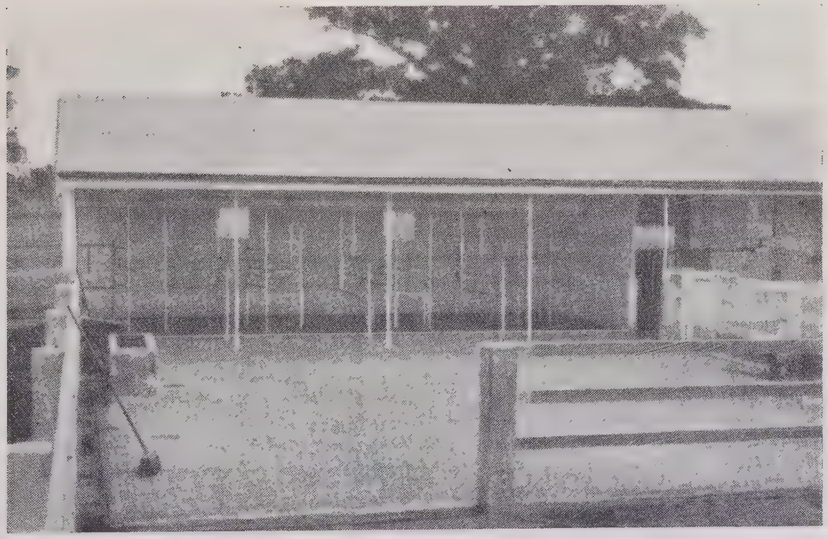


Plate 3

New Dairy Buildings Erected in 1958. Note the ideal appointments of tubular bails, concreted holding yards, provision of a water trough, and easy access to the milk room.

Plate 4

Grade A.I.S. and Jersey Herd Grazing a Regrowth of Irrigated Oats Crop.
Feeding is controlled with an electric fence.

Every effort to reduce contamination of milk to a minimum has been made. Concrete holding yards and stock-free areas adjacent to the milk room are a feature of these premises. An additional minor practice is to stir all milk on removal from the refrigerator before loading for despatch to the factory. It is claimed this assists in the removal of any gaseous off-flavours generated in the milk during storage.

The benefits of these precautions have been realised in the fine quality milk supplied by Mr. Hurley since he commenced market milk production in May, 1958. Apart from an initial few cans affected by mastitis, all milk has been graded top quality at the factory.

Machinery

With the intensive cultivation practised on this property, a full range of farm machinery is necessary with, of course, the tractor the first and foremost item. Additional equipment includes a chisel plough, a disc plough, a bush and bog, a spring tooth cultivator, a power mower and diamond harrows. For feeding requirements, a chaff cutter and a pumpkin slicer are installed in the feeding shed.

It is interesting to realise that all this machinery has been purchased during Mr. Hurley's tenancy.

Other Income

Potatoes have proved a valuable supplement to the main income from dairy produce. Two crops are grown each year, Sebago and Sequoia varieties being planted, the second variety being used for the summer crop. Last year an area of 2½ acres was cropped and production averaging 6 tons to the acre obtained. Care is taken to plant in different areas each year. To assist with harvesting, a home-designed potato digger suitable for drawing behind the tractor has been made.

Future Plans

The three years of progress achieved on this farm have been in the form of development and consolidation in an attempt to provide sufficient income from dairy produce to support three families. Major expenditure in developmental work has been completed and the owners anticipate a financial profit in the coming season.

It is the aim of all market milk producers to possess large milk quotas and in this regard Mr. Hurley will endeavour to maintain the daily winter milk production in the vicinity of 100 gal. He considers this can be achieved by having each cow average a production of 2½ gal. daily. With this guarantee of a consistently large volume of good quality milk, quota supplies have been increased from 20 gal. in 1958 to 68 gal. in October, 1959.

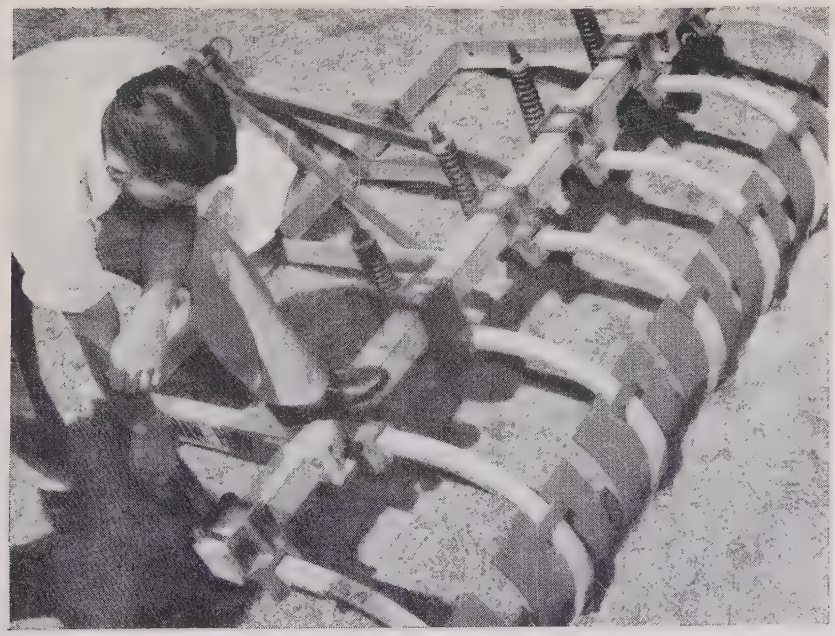
As from this year, all herd replacements will be bred on the farm to eliminate the guesswork in purchasing replacements where no production records are available.

The planned increase in the acreage of lucerne should make it possible to provide all stock with home-grown feed and thus minimise the expenditure necessary to purchase supplementary feed to ensure top production.

This farmer's progress and his confidence in the future of the dairying industry deserve success. If the next three years' operations on this property meet with the same results as the developments which have occurred since 1956, the plans of the owner should be achieved.

◆

To Rake Sticks



Plough Used As Stick Rake. This gadget, made by Mr. R. Eley, of The Gums, attracted a lot of attention at the Toowoomba Farmers' Festival. It consists of steel plates curved to fit the shanks of a chisel plough. The spring release safeguards against damage by rocks and stumps when the implement is used to rake sticks into windrows and heaps.

Plate 1: A Crop of Poona Cowpea and White Panicum being

Early Summer Feed For Dairy Cows in South Coastal Queensland

By N. J. DOUGLAS,
Adviser in Agriculture.

Here are some suggested crops that should provide early summer feed in the coastal dairy districts of south Queensland:

Each year in the coastal dairying districts of south-eastern Queensland, there is a demand for summer-growing annual crops which can be grazed to provide supplementary feed during the late spring and early summer months. Usually these crops are grown under rainfall conditions but, earlier—hence more profitable—grazing is obtained if these crops can be started under irrigation. It may take only one 2-in. application of water to keep the crop growing from one storm to the next. If continuous growth can be maintained, high quality grazing is available when it is most needed.

A wide range of soil types is represented in the districts under discussion. Most will grow a good grazing crop, providing land preparation is adequate and fertilizer is applied at planting time. With the exception of alluvial country, a nitrogen-phosphate fertilizer in the ratio of 1:2 applied at the rate of 2 cwt. to the acre will result in greatly increased yields.

Cowpea-White Panicum Mixture

A mixture of Poona cowpea and white panicum has been the most popular of all the summer grazing crops. In recent years, Poona cowpea has become susceptible to a stem rot disease. However, new strains of cowpeas with specific resistance to the disease should be available shortly. A sowing mixture of 25 lb. of cowpea and 10 lb. of white panicum to the acre can be broadcast and harrowed in after the first good storm rains.

In all instances, it is advisable to treat the cowpea seed with inoculum which can be obtained

Plate 2

A Close Up of a Well-Grown Crop of White Panicum and Poona Cowpea that is Ready for Grazing.

free of cost from the Department of Agriculture and Stock at Brisbane, Cooroy and Gympie.

This mixture is an excellent crop to condition ground before planting clover/ryegrass pastures, particularly in areas where mat grass and/or couch grass are a problem.

White Panicum and Japanese Millet

Areas of straight white panicum or Japanese millet make very useful grazing. The broadcast sowing rate is 20 lb. to the acre. A nitrogen-phosphate fertilizer markedly increases the amount of grazing. Growth of these crops is rapid, particularly Japanese millet, which can often be grazed 4 to 6 weeks after planting when weather conditions are favourable for growth.

General observations taken in the field indicate that the cowpea/white panicum mixture is a better overall proposition than the straight millet crops. This is because the cowpeas help to maintain or increase soil fertility. The residual effect of the legume is often reflected in a succeeding crop of oats. The extra vigour and colour of oats sown on land which has been precropped with cowpeas are usually quite discernible.

Sudan Grass

Sudan grass is widely grown throughout the coastal district for grazing purposes. It is a robust grower, resistant to dry conditions. It may be planted as a straight crop but a mixture of cowpea and sudan grass is preferable.

The sweet sudan variety has been selected for its free-stooling habit, leafiness and palatability and has largely replaced the old strains of sudan grass. It is usually sown broadcast at the rate of 14-15 lb. to the acre. A nitrogen-phosphate fertilizer will increase the yields obtained from this crop. The grass makes rapid recovery after grazing, and several grazings may be obtained during the season.

While the grass is commonly grazed at all stages of growth, occasionally stock losses are experienced. Once the plant has reached the flowering stage, all danger of poisoning is past. It is recommended that even with sweet sudan, all customary precautions should be taken to prevent prussic acid poisoning.

Velvet Bean

Since the appearance of stem rot disease in cowpeas, velvet beans have been grown as a grazing crop in areas where this disease was prevalent. Velvet beans are primarily a green manure crop. It is 4 to 6 months before the pods commence to ripen, whereas, the cowpeas reach this stage within three months.

As a grazing crop, velvet bean will easily outyield any cowpea and its long growing period will allow it to carry well into the cooler months. Therefore it will provide valuable grazing during the period when, normally, the quality of the pastures is declining.

Velvet beans are broadcast at the rate of at least 30 lb. of seed to the acre. If planted in drills, 4 to 5 ft. apart, approximately 10 lb. of seed to the acre is sufficient. They should be planted with the first spring rains.

Maize may also be sown with velvet beans. If this is done, the usual method adopted is to sow two rows of maize 3 ft. apart, to one row of velvet bean sown at the same time or up to six weeks later than the maize.

Plate 3

A Close Up of a Sweet Sudan/Poona Cowpea Mixture that is Ready for Grazing

Again, it is recommended that the legume seed be inoculated before planting. For maximum yield, early, light and intermittent grazing should be practised.

When to graze

Grazing of annual crops such as white panicum and Japanese millet should not be delayed until seed heads are formed, as much of the regrowth potential of the crops is lost. The aim therefore, is to commence grazing when the height of the crop is 12 to 15 in.

Strip grazing should be practised when possible. This system of grazing enables fullest utilization of the crop. It is particularly suited to small areas where available feed has to be rationed.

Often, at the first grazing of a mixture containing these legumes, dairy stock tend to ignore the legume. However, they soon develop a taste for cowpea or velvet bean and will eat these crops readily.

Hay and Silage

The crops mentioned are suitable for both hay and silage. Provided hay-making can be carried out before the wet season, a valuable reserve of good quality hay may be stored for future dry springs and droughts.

"See How It Works?"

At the Toowoomba Farmers' Festival, Mesdames A. B. and B. J. Behrendorff, of Bonjeen, inspect Mr. K. M. Trease's entry in the farm gadget competition. It is a tractor-driven grain crusher which bags the crushed grain and also chaffs hay. It has a capacity of ½ ton of grain an hour.

Bucket And Bail

Save Money on Cream Cans.—Careful handling, right from the time they come brand new from the store, will prolong the useful life of milk and cream cans. Neglected or roughly treated, they will quickly deteriorate and become unsuitable for carrying dairy produce.

Whether your replacement costs are heavy or light lies largely in your own hands.

From the time you start using them, the cans are exposed to attacks by acid milk and cream and by washing solutions. The action of these substances gradually destroys the thin layer of tin on the cans. The steel is then exposed and rusting will commence. Unchecked, rust will quickly eat right through a can, making the re-tinning more expensive.

Exposed steel in a can imparts a tallowy and oxidised flavour to milk and cream. This flavour cannot be removed during butter-making, and the cream has to be down-graded.

To prolong the life of cans, these precautions are suggested:

1. Wash your cans thoroughly and sterilize them with boiling water or steam. Stand them upright until the steam has escaped and the can has dried; then turn them upside-down on a dust-free storage rack. If possible, always wash up in rain water.

2. Use cleansers at the correct strength, and use stiff bristle brushes. Never use steel wool or metal fabric, as these quickly cut off the tinning.

3. Rinse the cans with the chlorine solution (at the correct strength) only a few minutes before use. Never rinse with a chlorine solution after washing up.

4. Inspect the cream stirrer for sharp edges. Use the stirrer by plunging it up and down in the can; don't roll it around the sides of the can.

5. If cans are not being used for long periods, wipe them over with an oily rag and store in a clean, dry place. Wash thoroughly and air before use.

—*N. E. FOWLER,*
Dairy Officer.

Longer Life for Dairy Rubber.—Absorption of butterfat by dairy farm rubberware is a major cause of inefficient milking and contamination of milk and cream by bacteria. Only constant care will improve the efficiency and extend the life of dairy rubberware.

Most types of rubber used in dairy equipment readily absorb fat. This causes the rubber to swell and accelerates the damaging effect of sunlight. Cracking and ageing of rubber lead to inefficient milking and form ideal sites for the growth of bacteria.

The rubber flaps on the releaser spit chamber are often swollen from fat absorption. This may allow air to be drawn into the releaser, causing frothing and carry-over to the vaccum tank. In bad cases, the releaser may flood.

The combined action of fat and sunlight on milk tubes and claw rubbers can cause them to crack and swell until they slip off during use. Similar cracking also occurs at the mouths of the teat cup inflations. When cracks form on the inside surfaces or penetrate from the outside, it's time to replace the worn rubber with a sound piece.

No cleaner can prevent completely this absorption of fat by rubberware. But caustic soda will remove a great deal of the fat, especially when the rubberware is boiled in a caustic solution for 10 minutes. This treatment should be carried out at least once a week, using one tablespoon of caustic soda to four gallons of water. Regular care of this kind will pay off in lengthening the life of the rubber and improving the quality of milk and cream.

Another approach in reducing the fat absorption of rubber lies in the use of the new synthetic rubbers. These do not absorb fat so readily as natural rubbers. For this reason, milking rubberware made of synthetic rubber can be expected to have a longer life than that made from natural rubber.

—R. T. WESTON,
Dairy Adviser.

A Culling Necessity.—The present high price of cattle for tinning offers dairy farmers a profitable avenue for the disposal of culls. Most farmers are taking advantage of the high price and are getting rid of their unwanted cows. But there is one thing which is causing concern to the dairying industry—are farmers sure that they are not selling their profitable cows?

If a man is production-recording his herd he knows which cows to sell. But what of the farmers who are not recording? They could be selling their highest producing animals.

What a tragedy it would be if a farmer culled his herd without production records, and later on found that he is left with cows of below average production.

Why run this risk when for a small outlay you can record your cows and be sure that you are disposing of the unprofitable ones.

—S. E. PEGG,
Chief Adviser, Herd Recording Section.

* * *

Plan Now For November

Mate cows now to ensure seasonal calving.

Milk and cream should be cooled to preserve quality.

Change the separator oil.

Check your milking machines for milkstone.

Plant summer crops.

100 Years of Queensland Dairying—II.

Progress With Breeds And Production

By E. B. RICE,
Director of Dairying.

The system of herd-book registration of dairy cattle began in this State with the foundation of the Queensland Dairy Herd Book Society, the first such society in Australia, in 1900. It catered for all dairy breeds and in its first volume issued in 1900 there were registered 34 bulls and 69 cows of the Jersey breed, 12 bulls and 49 cows of the Ayrshire breed, 1 bull and 1 cow of the Guernsey breed, 1 bull and 1 cow of the Holstein breed.

A Jersey Cattle Society was formed in Queensland in November, 1906, and issued its first herd book in 1907 in which were also included all Jersey cattle previously recorded in the Jersey section of the Queensland Dairy Herd Book. The total Jersey registrations then were 157 bulls and 378 cows. A reference to an advanced register of dairy stock is found in volume 8 of the Society's herd book issued in 1918. Testing of cows for entry to this register commenced in 1916. The requirements for entry were for cows under 3 years to produce in 48 hours at least 2 lb. commercial butter, cows under 4 years 2½ lb. and cows over 4 years 3 lb. A bull was eligible for A.R. rating if four of his daughters had so qualified. The cows were tested by officers of the Department of Agriculture and Stock.

The Ayrshire Cattle Society of Queensland, which was founded in 1912, issued its first herd book in 1915. There were 321 bulls and 758 cows in this first volume. This Society believed it was the first Australian herd book to contain an advanced register, provision for which was made in August, 1914. For entry to this register a cow had to produce 2 lb. butter in 2 days if under four years of age and 2½ lb. if over four. A bull which had sired four A.R. cows qualified for the register.

The Holstein-Friesian Cattle Club of Australia, which was formed at a meeting held in Toowoomba in April, 1914, published its first herd book in 1917. The Society's name was changed in August, 1918, to the Friesian Cattle Club of Australia. The first herd book contained 28 bulls, 23 of which were in Queensland, and five in New South Wales. There were 143 cows, of which 94 were in New South Wales, 48 in Queensland and one in South Australia. This herd book also contained four appendices (which were closed on 30th April, 1919) in which were 34 cows. Female progeny of these cows if sired by a registered bull were subsequently entered in the herd book, the number of upgradings by a purebred sire depending on the section of the appendix in which the cow was entered.

The advanced register is referred to in Volumes 1 and 2 of this Society's herd book published in 1920. The minimum yield to entitle a cow to advanced register entry was 3½ lb. commercial butter in 48 hours for a cow five years or older, an allowance of .01 lb. being made for every 7 days under 5 years, with a minimum yield of 2 lb. for the 48 hours.

The foundation volume of the Illawarra Dairy Cattle Association of Queensland was published in 1918. There were 29 bulls and 559 cows entered in this volume. A condition of entry in this Society's herd book was that a cow must pass a butterfat test on the following standards:—

2 permanent teeth, 2 to 2½ years, 7 lb. a week.

2 to 4 permanent teeth, 2½ to 3 years, 8 lb. week.

4 to 6 permanent teeth, 3 to 4 years, 9 lb. week.

Full mouth, over 4 years, 10 lb. week.

The weekly yield was calculated on a 48 hours' test by an officer of the Department of Agriculture and Stock.

A bull was eligible for registration if four of his daughters had qualified for registration.

An Advanced Register was begun in January, 1918. The qualification for entry of cows was that they had been tested twice (48 hours' test) during a lactation period and had produced the following calculated yields of commercial butter in 7 days:—

Age	After Freshening	Not less than Six months after Calving in the Same Lactation Period
	lb.	lb.
2 to 2½ years . .	11	6
2½ to 3 years . .	12	7
3 to 4 years . .	13	8
Over 4 years . .	14	9

If four of his daughters had qualified for the Advanced Register, a bull was also eligible for this rating.

There were at least two purebred Guernsey cattle in Queensland in 1900, as Volume 1 of the Queensland Herd Book Society contains the names of one bull and one cow of this breed, both being owned by the Agricultural College at Gatton. A Queensland branch of the Guernsey Cattle Society was not formed until 1928. However, in Volume 5 of the Herd Book of the Australian Society, issued in 1923, there were the names of three Queensland breeders who owned three bulls and 28 cows which were in the register.

Table 1 gives the membership of Dairy Cattle Breed Societies in May, 1959, and the herds recorded under the Purebred Recording Scheme. It will be seen that only 10 per cent. of registered stud breeders have their herd production recorded.

Progress in Farm Practices

The standards of dairy buildings and of hygiene were causing concern at the beginning of the present century. There was stated to be a need for instruction and legislation

TABLE 1

MEMBERSHIP OF BREED SOCIETIES MAY, 1959

Herd Book Society	Membership	Herds Tested	Percentage
A.I.S. ..	390	48	12
Ayrshire ..	46	5	11
Friesian ..	60	12	20
Guernsey	86	12	14
Jersey ..	580	43	7
Total	1,162	120	10

to overcome the ignorance and carelessness which were evident in production methods on dairy farms.

What appear to have been the first model dairy farms in the State were at Talgai West. The Scottish Investment Company had five dairy farms on its property, four of which were occupied by tenants on a share-farming system. There was a total of 410 cows on the farms. The farming practices there in 1901 were in strong contrast with the general methods of the times. The cowsheds had concrete floors and were effectively drained, milk was cooled and strained, the dairy utensils were steamed and there was an adequate supply of water, pumped from a windmill, at the shed. Fodder crops were grown for the herd to supplement the paddock grazing of the indigenous grasses and silage was made from maize. These farms would almost certainly have been the first in Queensland on which systematic records of production of cows were kept. Daily milk yields were recorded of all cows and butterfat tests were also made at intervals. The production records were used for breeding and culling.

The invention of the milking machine and its possibilities were mentioned in 1904, but it was only in the 1920's that real headway was made in installation on farms. Machine-milking made rapid progress after 1945, and in 1957 there were 16,482 milking units (sets of teatcups), installed on Queensland farms. In some of the major dairying districts, 98 per cent. of the cows are now milked by machine.

The inadequacy of fodder reserves on dairy farms and the desirability for more attention to fodder conservation has been pointed out from time to time in various reports right from the latter years of the last century. This has often been highlighted by quoting the ravages of the periodically recurring droughts. It was estimated that the 1915 drought caused losses of £2,316,000, of which £1,356,000 was due to decreased quantities of dairy products and £960,000 was through stock losses. Butter production in 1927-28 was 19 per cent. below that of the preceding year, and in 1936-37 it was also 25 per cent. lower than in 1935-36. In the 1946-47 drought, the estimated losses were £2,500,000 for dairy products and £1,000,000 for stock and in 1951-52 they were £10,000,000 and £5,000,000, respectively.

Grade herd recording began in Queensland in 1910, but for some years farmers' herds were only recorded when an officer was in their particular district. Many herds in these years would have been recorded only once during a lactation. The system was known as the farmer's-sample system, whereby the farmer weighed and sampled the milk from each cow in his herd during the four milkings in two days and took the samples of milk to an officer who visited the district to carry out the butterfat tests. In 1925, the rules governing herd recording were altered to require a farmer to have at least four tests made at approximately two-monthly intervals during a lactation period. He weighed and sampled the milk of each cow during the 24 hours' test periods, and the fat tests were done in the Brisbane testing room or at factories. All records were compiled for the farmer by the Department.

The group herd recording scheme under which a herd tester is appointed to visit each farm in a group of 20 once monthly to weigh, sample and test the fat content of each cow in the herd was inaugurated in 1948. From eight groups in 1948, the numbers were extended to 83 groups in 1958.

Testing of purebred dairy cattle for a 273 days' lactation period was commenced in Queensland in 1921, but owners then entered only selected cows. Five tests, each over a 24 hours' period, were made in a lactation, the animal being stripped out under the supervision of the Departmental testing officer at the milking preceding each test.

From 1st July, 1923, the official Registered Purebred Dairy Cattle Production Recording Scheme commenced. In a stud herd entered under this scheme, at least 25 per cent. of the registered purebred cows were required to be submitted for testing. The prescribed production standards for entry to the advanced register of Dairy Cattle Breed Societies ranged from 200 lb. for junior two-year-olds to 350 lb. for mature cows, the increments being of 25 lb. for each increase of six months of age. From 1st July, 1930, the junior two-year-old standard was lifted to 230 lb., and the other age standards remained as before, but the increments then became 20 lb. for each successive age group.

In 1948, the rules of the Department of Agriculture and Stock were amended to require not less than one-third of the registered purebred cows in a herd, including all cows during their first lactation, to be recorded. This was to enable sire surveys to be made. From 1st July, 1958, all registered cows were required to be recorded in every herd entered under this scheme.

The appointment of a Pasture Improvement Committee in 1930 was indicative of an awakening of interest in the need for improved pasture management in dairying districts.

Refrigeration for cooling and holding cream on farms was pioneered in the Roma district in 1936 due to the initiative of Mr. R. S. Beresford, Manager of the Roma Co-operative Dairy Association. By 1941, there were about 100 refrigerators in dairy sheds in various parts of South Queensland, mainly in the Roma district. The Queensland Butter Marketing Board commenced to make farm refrigerators in 1946 and due to an arrangement with the Agricultural Bank for their purchase by farmers on a low deposit and monthly instalments deductable from the farmer's pay cheque from the factory he supplied, farm refrigeration then made steady progress. This year there were 2,500 farm refrigerators in the State.

In 1939, steam sterilization for milking machines and farm dairy utensils was introduced, the initial installations of low-pressure steam sterilizers being made on a number of farms on the Darling Downs. However, as electricity began to be reticulated rather extensively in rural areas after 1945, farmers generally preferred to install electric hot water boilers, which were more convenient than the steam sterilizers which depended on wood or kerosene fuel.

A dairy shed, known as the combined dairy building, was designed in 1939 to enable all milking shed operations and storage of milk and cream to be done in a single building. Previously, the milk and cream were required to be stored and the utensils washed and kept between milkings in a dairy at least 30 ft. away from the milking shed. The extension of machine-milking, and refrigeration, necessitated all operations being centralised in one dairy building.

The Queensland Dairymen's Organisation, which was formed as an organisation to represent the views of Queensland dairy farmers before Governments and so on, started as a voluntary organisation in April, 1940, and in 1946 was given statutory authority under the Primary Producers' Organisation and Marketing Acts.

Some important developments in dairy farming in Queensland took place in the years after the 1939-45 war. The reticulation of electricity to rural areas led to its rapid use in dairy sheds for motive power and heating water supplies; there are now 5,635 electric water heaters in dairy sheds, whereas their numbers were negligible in 1939. Machine-stripping of cows began to displace hand-stripping, about 30 per cent. of farmers having ceased to hand-strip by 1958. Interest in dryland pasture improvement and management has now become widespread through the dairying districts, and irrigated pastures, which scarcely existed in dairying districts in 1945, are being established at a rapidly increasing rate on farms where irrigation is practicable.

The buckrake and forage harvester are leading to a growing adoption of silage-making, and the chisel plough is assisting in the establishment of improved pastures. Advances in earth-moving machinery are creating interest in water-harvesting, although only a few farms have so far adopted this method of conserving water for irrigation of pastures or fodder crops. Artificial breeding schemes are in operation in the Nambour and Atherton Tableland districts.

Progress and Statistics

The statistics in Table 2 show the development of the Queensland dairy industry since the beginning of this century:—

TABLE 2

Year	Dairy Cattle	Total Milk Production (000 gals.)	Butter (000 lb.)	Cheese (000 lb.)	Condensed Milk (000 lb.)
1900–01	136,000	23,825*	9,742	2,437	..
1910–11	357,095	71,770	27,859	3,718	6,228
1920–21	554,208	151,081	60,923	15,201	15,169
1930–31	775,301	224,085	95,719	13,648	..
1940–41	1,446,731	279,267	119,940	11,733	..
1950–51	1,440,198	278,111	106,281	19,430	..
1957–58	1,269,969	207,753	72,308	11,590	(drought year)

* Milk used in butter and cheese only.

In 1902, the investment in dairy factories was stated to be £51,000 on machinery and plant and £48,000 on land and premises. In 1905, the dairying industry was making the most progress of all sections of Queensland agriculture. By 1920 the capitalised value of dairy products produced in Queensland was estimated to be between £7,000,000 and £8,000,000. The peak values were recorded in 1952-53, when the estimated total value of milk for consumption (ex farm), milk products (ex factory), and by-products (for animal feeding) was £36,000,000.

Capital investment in the dairy industry was estimated to be £35,000,000 in 1930.

A rapid expansion phase of dairying in Queensland was between 1927 and 1937, when the total number of dairy cattle rose by nearly 50 per cent. Several new areas which had been opened for dairying just before, and during, this decade, and the collapse of prices for other primary products, which was even more severe than for dairy products during the depression years of the 1930's were responsible for this expansion.

The record year for total milk production and butter was 1938-39, when 347,000,000 gal. of milk and 154,378,000 lb. of butter were produced. The average milk yield of 361 gal. per cow was also the highest ever attained. However, the record year for the dairy cattle population was not until 1943, when 1,574,000 dairy cattle were in Queensland. Cheese production reached its highest level of 28,501,000 lb. in 1942-43. The special request of the British Government during wartime resulted in a temporary changeover to supplying milk for cheese factories by many former cream suppliers whose farms were conveniently situated for assisting to expand cheese production.

In 1952-53, butter production (ex factory) reached the highest monetary value recorded of £23,672,000 of which £4,166,000 was Commonwealth Government subsidy.

Cheese production also attained its record monetary value of £2,378,000, including £269,000 as subsidy, in 1952-53. Capital investment in the industry in 1958 was estimated to be £200,000,000.

[TO BE CONTINUED]

◆

Spear Grass For Hay

"R.B.", of Bowen, has inquired about the suitability of spear grass for hay production.

Answer: It is generally considered that pure stands of spear grass are not particularly good for hay production. In a native pasture mixture, however, a small percentage of spear grass is permissible. This will not spoil the quality of hay produced, provided the mixture is cut in the very early flowering stage of the spear grass. Spear grass loses protein content rapidly after flowering and at the same time there is a considerable increase in the crude fibre percentage.

A Maternity Paddock For The Calving Cow

By S. G. KNOTT,
Divisional Veterinary Officer.

GOOD dairy cattle have regularly been bringing high prices and you can't afford to be careless with cattle, especially when they are worth so much.

Yet some people are unwittingly careless with their cows at calving time, even allowing them to calve in a dry paddock.

It is suggested that you might have a special maternity paddock near the house, where you and your family can keep constant supervision over the cows just before and immediately after calving.

In this way you can quickly tell if your cow is developing trouble at calving, and before she becomes

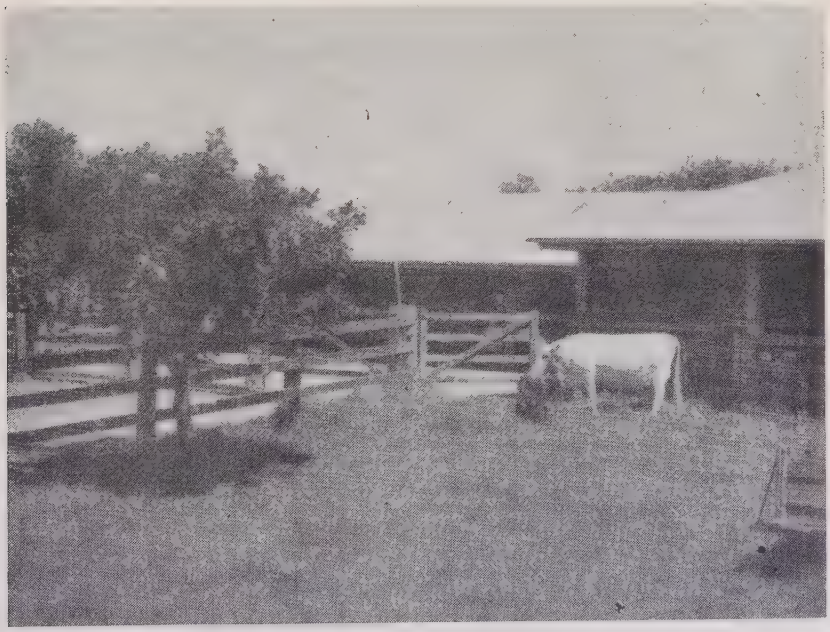


Plate 1

Cow and Calf in a Shady Maternity Paddock. This is situated close to the bails and house for observation.

exhausted and shocked you can call in a veterinary surgeon.

Value of Early Treatment

If a calving cow receives early skilled attention followed by proper treatment when trouble first appears, the chances of subsequent infection and toxaemia, injury to the womb and damage to vital nerves are lessened.

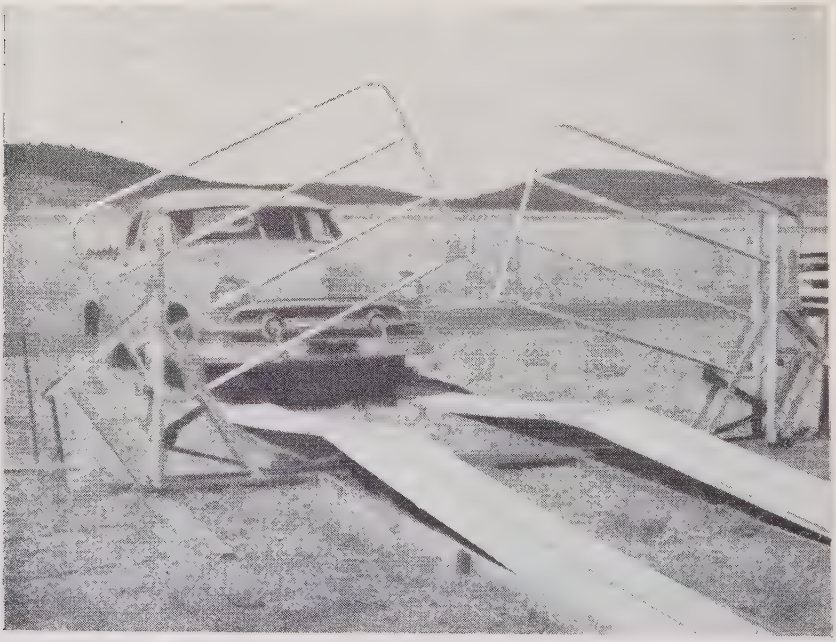
But early attention is emphasised if a cow is to make a quick recovery and milk to capacity.

Another advantage in keeping these cows close to home is that you can spot milk fever cases early. Early treatment will help prevent complications setting in.

If cows are allowed to become prostrate with milk fever, they run a big chance of inhaling regurgitated ruminal fluids into their lungs. Such cases may develop a pneumonia which usually ends in death. Keeping them handy can help to prevent this happening.

Cows lost at calving time represent a severe economic loss, but most of this can be avoided by putting them in a maternity paddock where they can be watched.

A Farmer's Ingenuity



Another Popular Gadget at the Toowoomba Farmers' Festival. These self-opening and self-closing gates were the prize-winning entry of Mr. C. H. Epple, of Goombungee.

Taking The Labour From Grain Feeding

By P. ROUND and K. A. TAYLOR*
Cattle Husbandry Branch.

HAND feeding of dairy cattle can make heavy demands on labour. In order to make better use of the work force, many dairymen aim to feed cows in the milking shed. This is especially so when concentrates are being fed.

In districts where cereals are readily grown, the feeding of some grain for long periods each year is common. The means of doing this vary. Some farmers carry each cow's ration from the feed room to the manger, while others install a feed hopper in the dummy bail.

In most cases the manger has to be filled when the cow is trying to enter the bail.

Where the feed hopper is located above the manger a gravity feeding system is often devised. This usually consists of a flap or valve operated by a lever extending out towards the operator.

There is general agreement that some type of elevated hopper is the most useful one but it poses some problems. The height above ground level calls for much lifting if the hopper is filled from bail floor level.

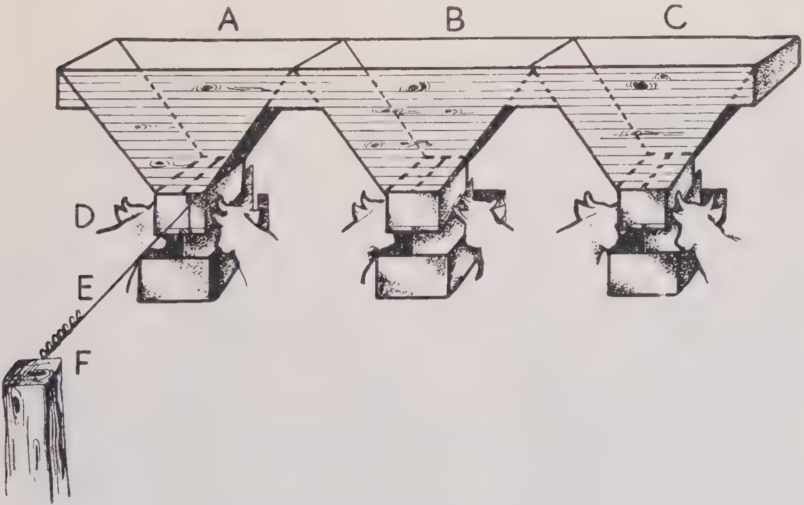


Plate 1

Suitable Hoppers and Mangers in the Bails.

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* Mr. Taylor has resigned since this article was written.

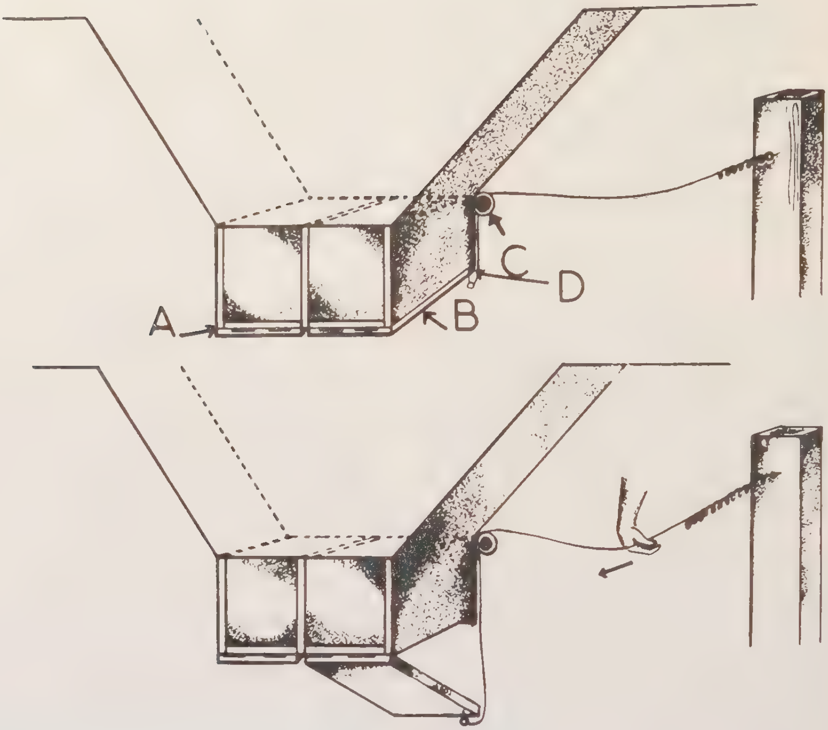

Plate 2

Shut (above) and Open Positions of the Mangers, as Seen from the Rear.

The top of a reasonably sized hopper will be close to the roof, which further increases filling difficulties. The presence of dust and feed particles also requires control measures.

Two Darling Downs farmers, Mr. Harry Beasley of Chinchilla, and Mr. Frank Filbee, of Jandowae, have tackled these problems. In the following diagrams and notes are set out the principles which they have successfully applied. The aim of the diagrams is to convey the general idea of two or three different installations. Interested farmers will be able to adapt the ideas to their own requirements.

Hoppers and Mangers

A system of hoppers and mangers which could be built by any farmer is shown in Plate 1. Grain deposited at points A, B, and C fills the hoppers. Each hopper serves two mangers into which grain passes by means of a trap-door. The trap-door at the base of each hopper is hinged at the rear. A taut wire E attached to a coil spring is fastened to the front of the trap-door, passes over a pulley and is fastened to a post F at the entrance to the bail. When the operator pushes forward on the wire (thus stretching the coil spring) the trap-door opens and grain flows into the

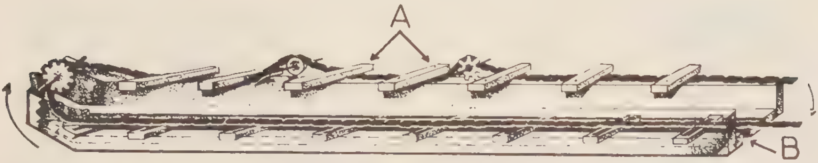

Plate 3

The Section of the Conveyor Belt Above the Hoppers.

manger. When he releases his hand the spring recoils and shuts the trap-door.

More detail of the trap-door as seen from the rear is shown in Plate 2. The top diagram shows the trap-door in the closed position. In the lower illustration the spring is extended and the trap-door open. Note that the hinges are inside the trap-door A and that the front end of the trap-door fits inside the front of the box D. This prevents a cow from opening the door with her muzzle. The pulley C is located in a position which ensures fast closing of the trap-door B.

Filling the Hoppers

The hoppers can be filled by means of a conveyor, shown in Plate 3. This consists simply of a chain belt to which wooden chocks A are attached. The chocks are at right angles to the direction of the run of the conveyor and they move the grain along over a smooth surface. Where the "floor" of the conveyor is above the hoppers it consists of spaced wooden strips B, thus allowing the grain to fall through and fill the hoppers. The wooden strips are placed parallel to the direction of travel of the conveyor.

This conveyor system is installed above the hoppers (Plate 1) and fills hoppers, C, B, and A, in that order.

Crushed grain can be fed onto the conveyor in different ways.

A Complete Layout

One system is shown in Plate 4. Here, grain gravitates from the silo

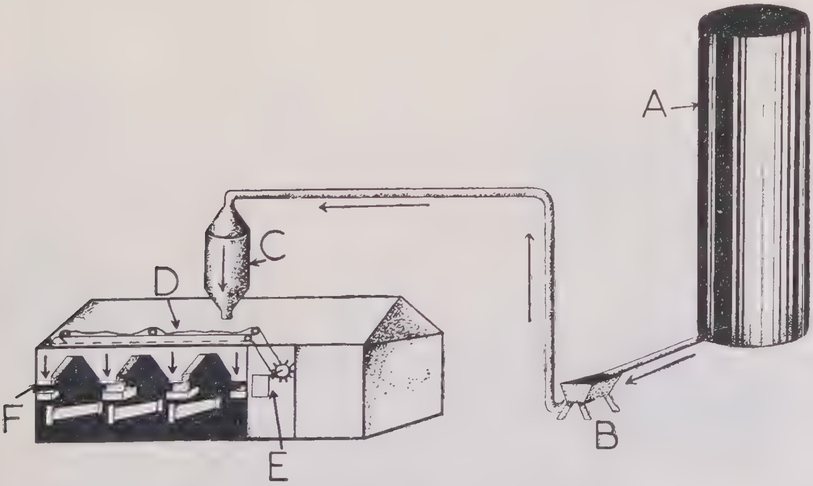

Plate 4

A Diagram of One Type of Complete Layout, Using a Hammer Mill.

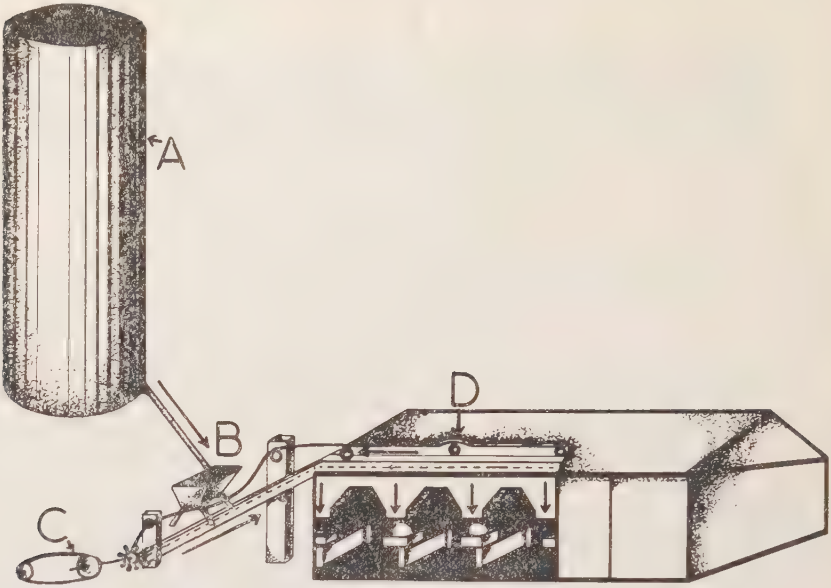

Plate 5

Another Suitable Layout, using a Grinder.

A to a hammer mill B where it is milled and blown into the storage tank at C. This storage tank is fitted into the dairy roof. Grain gravitates from the tank on to the conveyor. In this case the conveyor is driven by the engine which provides power for the milking machines.

A variation of this layout appears in Plate 5. In this case the crushed grain falls from a grinder on to the conveyor which extends out from the end of the shed. The conveyor is driven by an engine or tractor C.

Where a hammer mill is available, the layout appearing in Plate

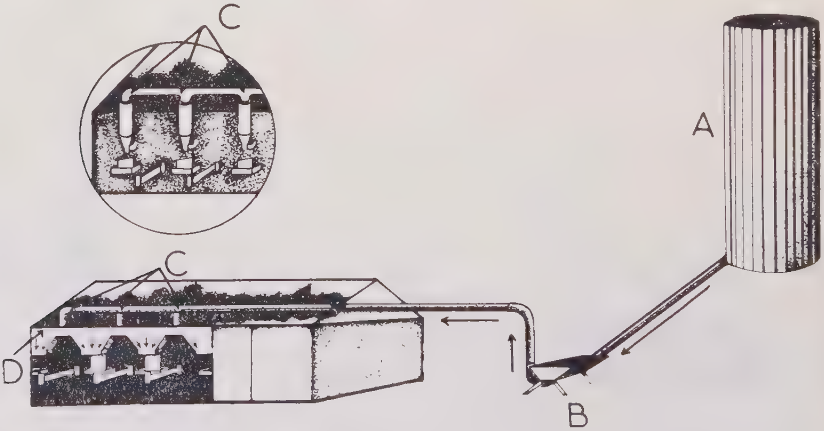

Plate 6

This Layout also Requires a Hammer Mill.

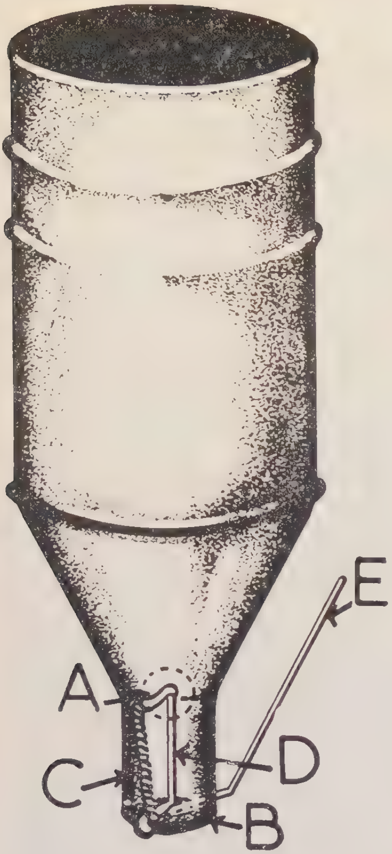

Plate 7

This Hopper Can be Made from a 44-Gallon Drum.

6 may be used. However, additional precautions by way of dust-proofing the hoppers are necessary. The tops of the hoppers need to be closed. As shown in Plate 6, the grain gravitates from the silo A to the hammer mill at B and thence is blown to the hoppers. Provision has to be made to close the outlets at C since in filling, two hoppers would be closed while the third was being filled.

The inset in Plate 6 shows hoppers of a different type. These have been made from 44-gallon drums and a fitted in the bails above the mangers. Hammer milled grain can be blown directly into these drums as shown at C in the inset.

Drum Hoppers

The construction and working of the drum hoppers are shown in Plate 7. A funnel-shaped extension is made to the 44-gallon drum. Circular metal flaps are indicated at Points A and B. A coil spring C holds flaps A and B in the indicated planes. A connecting rod D joins flaps A and B. E. is a lever which when operated alters the position of the flaps.

When the drum contains grain and the mechanism is in the position as illustrated, the grain is contained by flap B. When the lever E is pulled downwards both flaps A and B reverse their position with the result that flap A stops the flow of grain from the main part of the drum while flap B releases the grain held in the "neck". An exact amount of grain is thus released each time. When the lever is released the spring C returns both flaps to the position as illustrated thus allowing grain to again fill the "neck".

The diagrams illustrate systems suited to the walk-through type of bail and some modification may be necessary for other types.

Sowing Buffel Grass With An Old Cotton Planter

By K. B. ANDERSSEN,
Adviser in Agriculture.

A Gayndah farmer has adapted an old corn planter for the sowing of buffel grass seed into prepared land.

The current trend in the dairying and grazing industries towards the improvement or replacement of native pastures is being accelerated by the introduction of exotic species of grasses and legumes, among which buffel grass has assumed some importance. Unlike most of the introductions, this grass has presented a problem in planting, which has necessitated the development of special planting machinery and techniques. This is because the seed of this grass is covered in long hairs

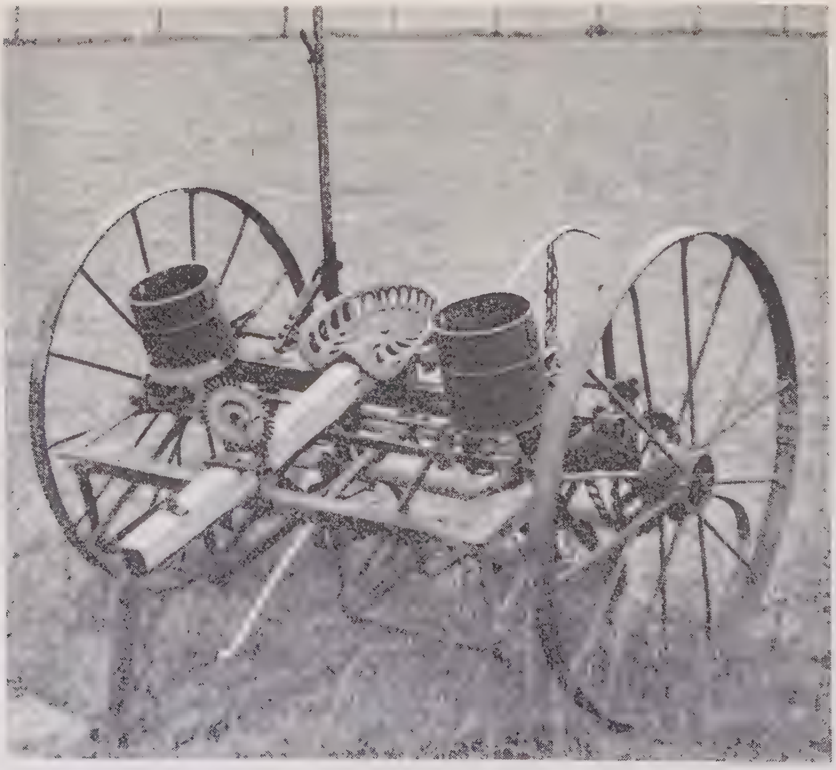

Plate 1

Two Row Cotton Planter.

Plate 2

Row Spacing Used in Row Planted Buffel Grass.

and bristles which make it cling together in loose masses. As a result of this, the seed will not flow readily through the ordinary planters, unless activated internally within the planters, or alternatively carried through in a mixture with readily flowing materials, such as sawdust or fertilizer. Minor adjustments or adaptations are frequently necessary.

One such adaptation has been made by a Gayndah farmer for the sowing of buffel grass seed into prepared land. This machine is the old two-row maize or cotton planter, with attached spring tines for scuffling operations (Plate 1).

Two Circular Seed Bins

Two circular seed bins, approximating 2 to 3 gal. in capacity, contain the bulk seed, which is agitated and regulated by revolving plates in the bottom of each bin. The seed drops through an opening in the bin, over the mouth of the concertina type hose, leading down to the appropriate tine, for the required planting depth and row width spacing (Plate 2).

The rate of seed flow is regulated by adjusting the size of the outlet by means of a sliding iron strip which is held in place by a bolt with lock, nut or screw.

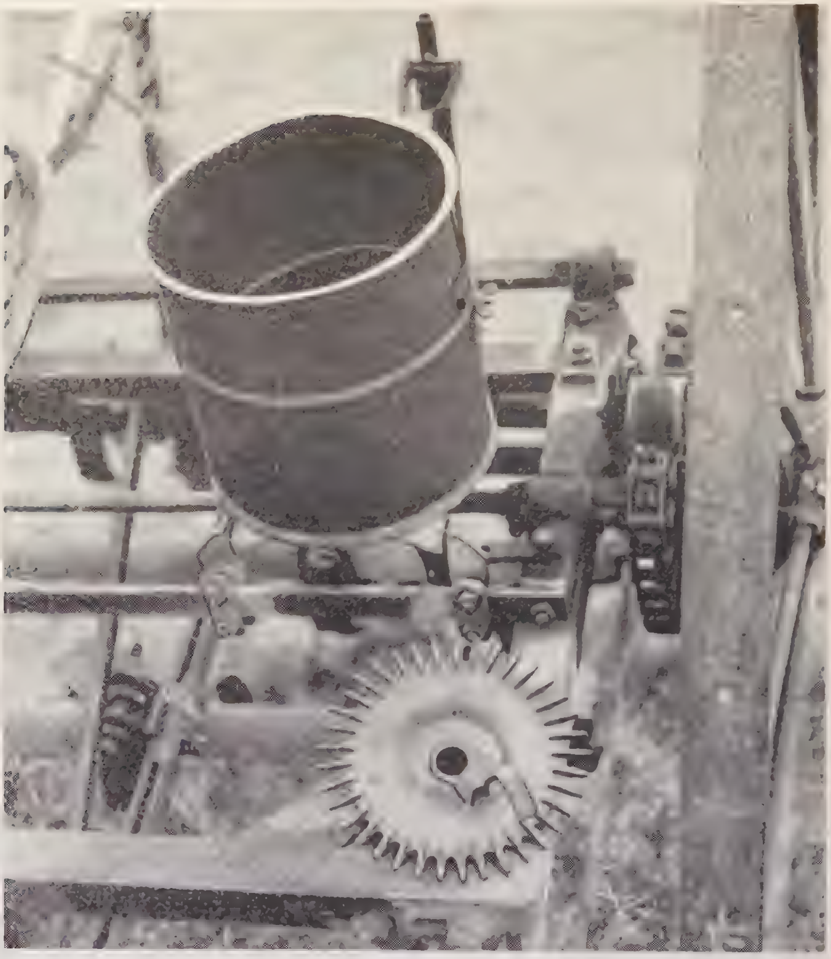

Plate 3

Seedplate Used for Fuzzy Cotton Seed and Buffel Grass.

The type of revolving plate found to be most efficient was originally produced in the early 1930's to sow fuzzy cotton seed. This plate is approximately 9 in. in diameter, and is smooth-surfaced on the lower side, in contact with the bottom of the bin. The top side is fitted with a series of small sharp raised fingers around its circumference (Plate 3). In practice, these fingers separated the fuzzy cotton seed and allowed it to drop with some form of regularity, through the outlet into the hose. The seed in the bin was further agitated by a vee-shaped piece of $\frac{3}{16}$ in. round iron, welded in an upright position onto the plate.

This old type plate is capable of sowing from 2 to 6 lb. of buffel seed to the acre, using both bins, by varying the outlet by means of the sliding iron strip. No sawdust admixture is required.

When sowing in rows (Plate 4) the seed hoses are pulled out of the shoes attached to the planting tines and the narrow bands of seed are covered by light trailing harrows. A soil covering of more than 1 in. leads to poor field strikes.

When broadcasting, the seed hoses are removed and a piece of 6in. hardwood is placed transversely across the planter, under the bin outlets. The seed then falls onto this board, which produces a spilling effect. Light tine harrows then complete the coverage of the seed.

A greater seed capacity in the bins can be obtained by attaching 4 gal. or 5 gal. oil drums to the seed bins (Plate 5). The attachment is made by inscribing a circle on the bottom of the drum with the same diameter as the seed bin.

Plate 4

Well-established Buffel Grass Sown with Cotton Planter.

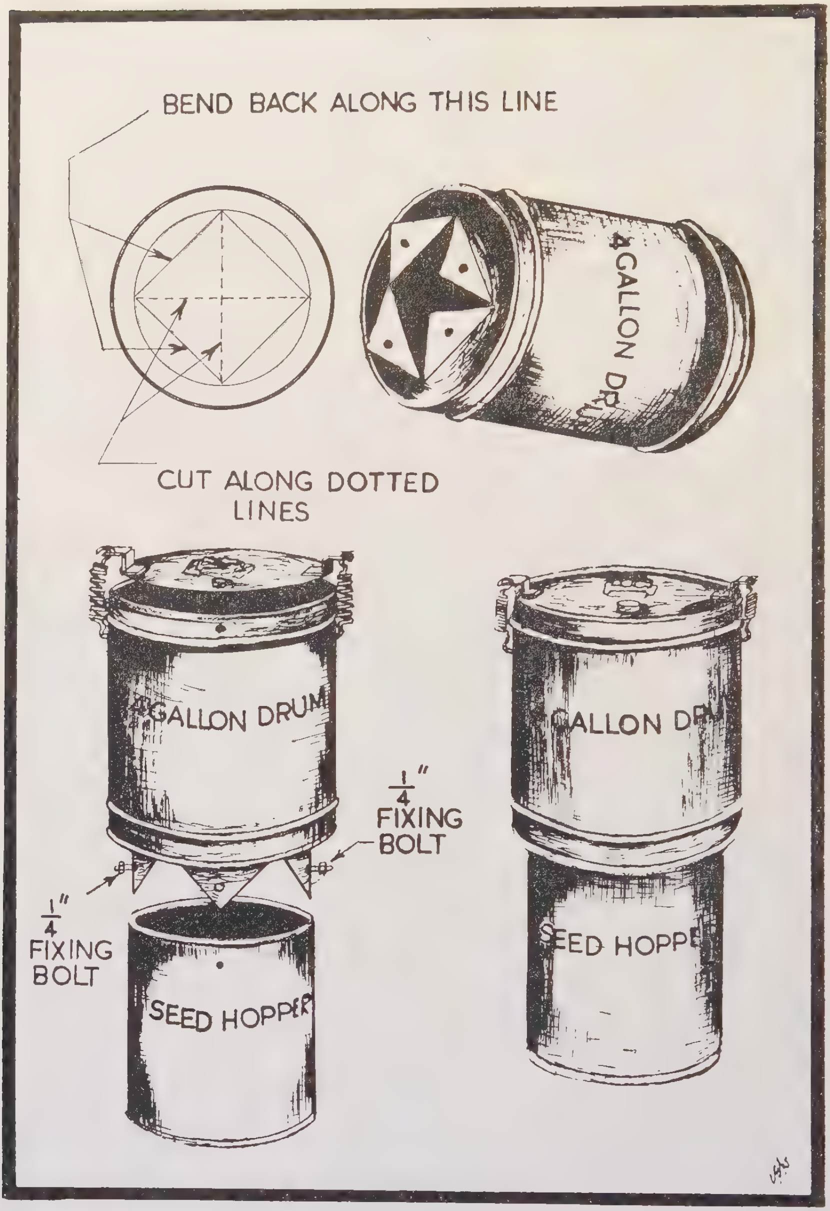
BEND BACK ALONG THIS LINE
4 GALLON DRUM
CUT ALONG DOTTED LINES
4 GALLON DRUM
1/4" FIXING BOLT
1/4" FIXING BOLT
SEED HOPPER
GALLON DRUM
SEED HOPPER

Plate 5

Simple Method of Increasing Seed Bin Capacity.

Two lines are then cut at right angles across the circle to its circumference. This produces four flaps, which are in turn folded down inside the seed bin. Holes are then bored through the bin into the four flaps, when placed in position on the bin. Quarter inch bolts are used to secure the drum in place. The top of the drum is cut out and thereafter used as a removable lid, when filling the joined containers.

Pasture And Crop

Forage Harvesters Under Test.—Flail type forage harvesters need almost twice the power for efficient performance as the chopping types, but they do have the advantages of greater freedom from mechanical trouble and cheaper maintenance. In all other respects, performances of the two types are virtually equal.

This summing up has emerged from tests by the British National Institute of Agricultural Engineering. Flail, fan, flywheel chopper and cylinder chopper types were tested under a variety of normal farm conditions. At present, only the flail and flywheel chopper types are in common use in Queensland.

All except the fan type reached an output of 18 to 20 tons an hour. But at this level, power consumption of the flail types rose steeply. It continued to rise even after an input of 40 h.p. At this figure, peak efficiency still had not been reached. The chopper group, while able to reach just as high an output in tons an hour, was far more efficient about the 20 h.p. level.

Power consumption is by no means the only yardstick by which to measure forage harvester performance. But it is unfortunate that the power requirements of the wider flail types are almost beyond the capacity of the tractors available on many farms. The flail types' heavy demands for power are especially evident when loaded trailers are being hauled up slopes during the harvesting operations.

In flail machines, most power is used in conveying the cut material. These machines cut quite well at rotor speeds far below those normally used, but to obtain adequate conveying of the cut material rotor speeds must be high.

Popularity of the flail machines appears to be due to their versatility in handling a wide variety of forage crops from short grass upwards; their freedom from blockages and mechanical trouble; their lower initial cost, and their simplicity and general cheapness of maintenance. One reported disadvantage of the flail types is that the ensiled material contains a quantity of dirt. This may be simply a matter of skill in operating the machine. But the possibility of the rotor sucking up dust from the bare ground should not be overlooked.

However, the peak has not necessarily been reached in forage harvester design. There is room for improvement in all types.

—*V. J. WAGNER,*
Chief Agronomist.

Preparing the Summer Seed Bed.—By far the best seed bed for summer pastures is that resulting from the efficient tillage of fertile soil. Most of the common pasture plants have small seeds and require a seed bed of fine tilth. Ploughing well in advance of sowing is desirable and the land should be allowed to lie in the rough state for a few weeks before further cultivation is undertaken. Heavy harrows, disc or tine cultivators will be required to break down the clods. Subsequent workings should aim at destroying weeds and compacting the subsurface soil. By compacting the soil close to the surface, a seed bed is provided which is favourable to the fine early root systems of the pasture plants. The seed bed should also be provided with ample moisture and in dry districts, cultivation operations throughout the seed bed preparation period should be carried out with due regard to the conservation of moisture.

—*A. HEGARTY,*
Agrostologist.

Farm Accidents.—More notice is being taken of farm accidents today and that is as it should be.

The use of mechanical instead of animal power makes for a higher proportion of severe injuries. For, while a horse will usually ease off and probably stop if anything goes wrong, a mechanical prime mover will keep going. Thus, if an accident occurs and the person injured is on his own—as is often the case —he may be quite unable to reach the controls to stop the machine.

Most machinery can be dangerous if wrongly or clumsily handled, but lack of thought, or the absence of a proper plan of work, may introduce quite unnecessary hazards.

Quite apart from the suffering involved, an accident may upset the whole routine of the farm. For example, a valuable worker may be put out of action for some time, and the machinery may be damaged. So remember it is better to be safe than sorry.

—*C. G. WRAGGE,*
Agricultural Engineer.

Fumigation of Tobacco Seedbeds.—Further studies on the fumigation of tobacco seedbeds with methyl bromide suggest that planting should be delayed until at least three days after treatment. There is now reason to believe that it is not safe to plant an hour after the covers have been removed. Last season, there were numerous complaints of bad strikes and patchy stands in tobacco seedbeds following the use of methyl bromide. In many cases, the trouble could be traced to fumigating for longer than 24 hours or to planting too soon after removing the covers. It is now felt that the beds should be aired for at least three days after removing the gas-tight covers.

Methyl bromide is a poisonous fumigant that evaporates readily. It is supplied as a liquid under pressure in cans or cylinders. When the pressure is reduced by opening the valve on a cylinder or piercing a can with a special dispenser, the liquid flows through a rubber tube into an evaporating pan. Earlier, this pan has been placed under an airtight plastic sheet covering the seedbed. The fumigant quickly evaporates from the pan and penetrates the soil. The cover is left on for 24 hours to ensure adequate penetration. One pound of methyl bromide is sufficient to treat 40 to 50 sq. ft. of seedbed.

In using methyl bromide, take extreme precautions to avoid inhaling any of the colourless, odourless but very poisonous vapour.

—*W. PONT,*
Pathologist.

Tobacco Seedbed Diseases.—Several destructive diseases lie in wait for tobacco seedlings right from the time the tiny seeds germinate. To neglect strict disease control in the seedbed is to risk total crop failure.

Damping-off is the disease likely to appear first. The collapse of patches of plants in the seedbed is usually the first indication of its presence.

If damping-off breaks out, prompt drenching with thiram will check its spread. Thiram drench, at 1 oz. of 80 per cent. thiram in 4 gal. of water, will give effective control of the disease. The drench should be applied at ½ to 1 gal. to 1 sq. yd. of seedbed.

Even if damping-off does not kill the seedlings, it may cause infections on the stem which are not noticeable at transplanting time. These may develop into stem rots in the field. Control of damping-off, therefore, helps to prevent outbreaks of stem rot later on.

Blue mould, however, is the major tobacco disease in Queensland. It is a fungus disease that attacks tobacco at any stage from small seedlings to mature plants ready for harvest. First indication of blue mould in a seedbed is the change of leaf colour from green to yellowish-green.

Fumigation with benzol will control blue mould in seedbeds and should not be delayed longer than 10 to 14 days after germination. The seedbed is enclosed overnight under a gas-tight cover and benzol vapour is introduced. The usual procedure is to enclose the beds and then introduce containers of benzol, supported on stands 5 to 6 in. above the ground. The best concentration of benzol is obtained when 1 sq. in. of evaporating surface is allowed for each square foot of seedbed.

In north Queensland, treatment should be applied every third night. But in south-western Queensland, where the plants are covered every night to prevent frost injury, it is advisable to carry out the benzol treatment each night also.

—*W. PONT,*
Pathologist.

Penetration of Wheat Roots

Wheat is often looked on as a comparatively shallow-rooted crop, and it may not be generally known that wheat roots frequently penetrate to, and obtain moisture and nutrient supplies from, depths over 6 ft.

Penetration of wheat roots to 8 ft. and below were recorded in a late-planted trial on deep alluvial soil of medium texture at the Biloela Regional Experiment Station some years ago. Only ·32 of an inch of useful rain was recorded between germination and maturity and a yield of 25 bushels to the acre was obtained.

Subsoil moisture was found to penetrate at least 8 ft. in many sampling sites. In five of nine sites, plants were using moisture below the 6 ft. level at maturity. At these sites, the moisture taken from the 6–8 ft. zone represented one-eighth of the total moisture utilized by the plant. This perhaps seems only a small proportion of the total but it is considered important in bringing the crop through to maturity and in helping to produce a good grain sample. Practically all available moisture in the top 4 ft. of soil had been utilized by the time of heading.

—*J. HARBISON,*
Regional Experiment
Stations Branch.

Tuberculosis-Free Cattle Herds (As at 1st October, 1959)

Aberdeen Angus

Crothers, G. H. & H. J. "Moorenbah", Dirranbandi
Elliott, A. G., "Ooraine", Dirranbandi
Mayne, W. H. C., "Gibraltar", Texas

A.I.S.

Cox, T. L. & L. M. J., Seafield Farm, Wallumbilla
Crookey, J., Arolla A.I.S. Stud, Fairview, Allora
Davis, W. D. "Wamba", Chinchilla
Dennis, L. R., Diamondvale, A.I.S. Stud, Mundubbera
Edwards Bros. "Spring Valley", A.I.S. Stud, Kingaroy
Evans, E. G., Lauraven A.I.S. Stud, Maleny
Green, D. B., Deloraine, A.I.S. Stud, Fairdale
Heading, C. A., "Wilga Plains", Maleny
Henry, Mrs. K., Greenmount
Henschell, W., "Yarranvale", Yarranlea
H. M. State Farm, Numinbah
Littleton, H. V., "Wongalea", Hillview, Crow's Nest
Marquardt, A. C. & C. R., "Cedar Valley", Wondai
Mears, G. S. & E., M. S. 755, Toogoolawah
Moore, S. R., "Sunnyside", West Wooroolin
Neale, D. G., "Groveley", Greenmount
O'Sullivan, Con., "Navillus", Greenmount
Phillips J. & Sons, "Sunny View", Benair, Kingaroy
Power, M. F., "Barfield", Kapaldo
Queensland Agricultural High School & College, Lawes
Radel, R. R. & Sons, "Happy Valley", Coalstoun Lakes
Roche, C. K., Freestone, Warwick
Sanderson, W. H., "Sunlit Farm", Mulgildie
Schloss, C. J., "Shady Glen", Rocky Ck., Yarraman
Scott, M. E. & E., "Wattlebrae", A.I.S., Stud, Kingaroy
Scott, W. & A. G., "Walena", A.I.S. Stud, Blackbutt
Shelton, R. A. & N. K., "Vuegon" A.I.S. Stud, Hivesville, Murgon
Sokoll, A. H., "Sunny Crest", Wondai
Sperling, G., "Kooravale", Kooralgin, Cooyar
Sullivan Bros. "Valera", Pittsworth
Sullivan, D. "Bantry", Pittsworth
Sullivan, F. B., "Fermanagh", Pittsworth
Thompson, W. H. "Alfavale", Nanango
Webster, A. H., "Millievale", Sabine, via Oakey
Wieland, A. W., "Milhaven", A.I.S. Stud, Milford, via Boonah

Ayrshire

Dudgeon, C. E. R., Marionville Ayrshire Stud, Landsborough
Dunn, T. F., "Alanbank", Gleneagle
Goddard, B., Inverell, Mt. Tyson, via Oakey
Holmes, L., "Benbecula", Yarranlea
Mathie, E. & Son, "Ainslie", Maleny
Scott, J. N. "Auchen Eden", Camp Mountain
Zerner, G. F. H., "Pineville", Pie Creek, Box 5, Post Office, Gympie

Friesian

Behrendorff, E. C., Inavale Friesian Stud, M.S. 786, Boonah
Macdonald, S. E. G., "Freshfields", Marburg
Naumann, C. H., "Yarrabine", Yarraman
Pender, D. J., Lytton Road, Lindum
Stumer, A. O., Brigalow, Boonah

Guernsey

Doss, W. H., Degilbo, via Biggenden
Fletcher, A. B. "Cossart Vale", Boonah
Holmes, C. D. (owner Holmes L. L.) "Springview", Yarraman
Johnson, G. L. "Old Cannindah", Monto
Miller, G. "Armagh Guernsey Stud", Armagh, M.S. 428, Grantham
Ruge, A. & Sons, "Woowoonga", via Biggenden
Sanderson, N. H. "Glen Valley", Monto
Scott, C., "Coralgrae", Din Din Rd., Nanango
Swendson, A. C., Coolabunia, Box 26, Kingaroy
Wissemann, R. J., "Robnea", Headington Hill, Clifton

Jersey

Beckingham, C. Trout's Rd., Everton Park
Birt, W. C. M., Pine Hill Jersey Stud, Gundiah
Borchert, Mrs. I. L. M., "Willowbank" Jersey Stud, Kingaroy
Burrows, R. N., Wondai, Box 23
Bygrave, P. J. L., The Craigan Farm, Aspley
Carpenter, J. W., Flagstone Ck., Helidon
Conochie, W. S. & Sons, "Brookland", Sherwood Rd., Sherwood
Cramb, S. A., Bridge St., Wilsonton, via Toowoomba
Crawford, R. J., Inverlaw, Kingaroy
Farm Home For Boys, "Westbrook"
Fowler, P. & Sons, "Northlea", Coalstoun Lakes
Harley, G., "Hopewell", M.S. 189, Kingaroy
H. M. State Farm, Palen Creek
Hutton, D. R., "Bellgrath", Cunningham, via Warwick
Johnson, H. G., Windsor Jersey Stud, Beaudesert
Lau, J. F., "Rosallen", Goombungee, Toowoomba
Matthews, E. A., "Yarradale", Yarraman
McCarthy, J. S., "Glen Erin", Greenmount, Toowoomba
Meier, L. E., "Ardath Stud", Boonah
Noone, A. M. & L. J., "Winbirra", Mt. Esk Pocket
Porter, F., Conondale
Queensland Agricultural High School & College, Lawes
Ralph, G. H. "Ryecome", Ravensbourne
Scott, Est. J. A., "Kiaora", Manumbar Rd., Nanango
Semgreen, A. L., "Tecoma", Coolabunia
Seymour, B. T., "Upwell", Jersey Stud, Mulgeldie
Smith, J. A. & E. E., "Heatherlea", Jersey Stud, Chinchilla
Tatnell, W. T., Cedar Pocket, via Gympie
Toowoomba Mental Hospital, Willowburn
Verrall, F. W., "Coleburn", Walloon
Weldon Brothers, "Gleneden", Jersey Stud, Upper Yarraman

Poll Hereford

Anderson, J. H. & Sons, "Inverary", Yandilla
Hutton, D. R. & M. E., "Bellgrath", Cunningham, via Warwick
McCamley, E. W. G., "Eulogie Park", Dululu
Maller, W., "Bore View", Pickanjinnie
Wilson & McDouall, Calliope Station, Calliope

Poll Shorthorn

Leonard, W. & Sons, Welltown, Goondiwindi

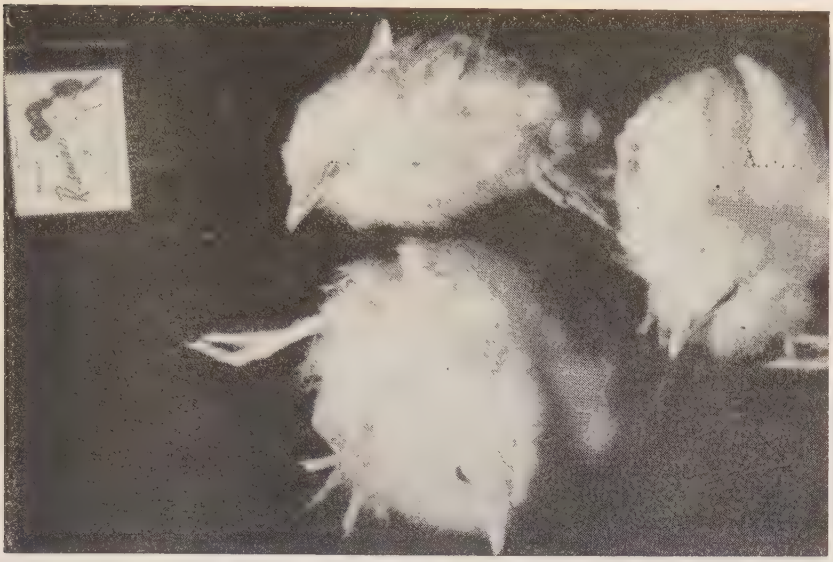

Plate 1. These Week-Old Cross-bred Chickens are Affected by Epidemic Tremor, or Avian Encephalomyelitis. Note the complete paralysis of the legs.

Epidemic Tremor in Chickens

By P. D. RANBY,
Veterinary Officer.

In the light of new knowledge, some helpful measures may be tried in the treatment of epidemic tremor in chickens.

Epidemic tremor or avian encephalomyelitis is a nervous disease of young chickens. The disease is caused by a virus which attacks the brain and spinal cord.

Outbreaks were much more frequent in Queensland last year than in previous years. The pattern was for one to four successive hatches to be affected. There is evidence overseas (in U.S.A.) based on blood tests that infection may be present in most flocks. Observations in the Brisbane area suggest that a low incidence of the disease occurs in many batches of young chickens hatched in the autumn and early winter and such cases are generally overlooked.

Signs to Watch

Outbreaks of epidemic tremor are seen in chickens up to about three weeks of age.

In a severe outbreak, 50 per cent. of the chickens may become paralysed (see Plate 1) while about 5 per cent. exhibit a peculiar rhythmic tremor of the head and neck and sometimes the tail. When the affected flock is small, the tremor may be absent.

In outbreaks in Queensland, the severity of the disease and death losses were high when chickens were affected at an earlier age than usual, that is, when only a few days old.

A cataract of the eye occurred as an aftermath of the disease on several farms in the Brisbane area. In addition, the usual leg weakness was seen in some of the survivors, while odd ones were slow-growing.

Be Sure It is Epidemic Tremor

The leg weakness and paralysis seen in epidemic tremor may be easily confused with any of the following: (*a*) rickets (*b*) crazy chick disease and (*c*) vitamin A deficiency.

Where confusion arises, veterinary advice should be sought. These various diseases can be readily distinguished even in the field. The presence of epidemic tremor can be confirmed by sending live chickens to the veterinary laboratory. The disease is identified by microscopic examination of brain tissue and by transmission tests.

How Infection Occurs

The virus of epidemic tremor is transmitted through the egg to the hatching chicken. Contact infection probably does not occur. It is likely that mosquitoes transmit the virus to older fowls. Breeding fowls thus infected do not develop the disease themselves, but pass the virus on through the eggs to the chickens. The 1958 outbreaks occurred after a heavy autumn mosquito wave and the hatcheries involved were situated in mosquito-infested areas.

Older Recommendation Changed

A recommendation made in the past should be changed in the light of new knowledge:

Rejecting breeding stock that have produced epidemic tremor chickens is of no advantage.

In fact, survivors of an outbreak and also the hens which produced them will not throw epidemic tremor chickens that next season. This is a result of immunity being passed through the egg.

Trial Measures

Measures that offer promise are:

Until more is known about how the disease is spread, it would be wise to reduce the local mosquito population.

Several types of vaccine have been tried overseas.

Vaccination of day-old chickens by the stab method using a live virus shows some promise. However, very small percentages develop the disease as a result of vaccination. The variable incidence of the disease from year to year would tend to reduce the practicability of vaccination.

Killed virus vaccines have the disadvantage that several injections are required in order to build up sufficient immunity.

It is generally accepted that many affected chickens may recover if separated and nursed. These measures are usually successful but may be disappointing in some outbreaks.

After recovery, the chickens may be kept for table purposes. With some culling, pullet chickens may be kept as layers.

Breeding from older hens should be safer but this is not always practicable. Older birds are more likely to be immune and pass the immunity through the egg.

The Fight Against Disease—II.

Causes Of Infectious Disease

By G. C. SIMMONS, Senior Bacteriologist.

The major groups of pathogens—those micro-organisms that produce disease—are explained.

It is not so very long ago that people believed in the spontaneous generation of disease and furthermore that sickness could be cured by ritual, incantation, or witchcraft. Ill health is such a personal thing that it is no wonder that quackery and mysticism were able to exert influence out of all proportion to the value of such practices.

Probably the first man to connect disease with the spread of living agents was Fracastorius in the 16th century. We know now that not all disease is caused by microscopic agents. However, the discovery of the germ theory of disease and the invention of the microscope by the Dutchman Anthony van Leeuwenhoek in the 16th century proved the forerunner of advances in medical and veterinary microbiology that have meant the virtual elimination of the great epidemics of infectious diseases that decimated both man and animal populations in the not-so-distant past.

Micro-organisms have been studied extensively and as a result classified into major groups. The vast majority of them are not disease-producing and are called *saprophytes.* Man learnt unwittingly of the benefits that certain microbes could give him in such processes as the manufacture of cheese and fermented beverages.

Also, in the Asian countries the beneficial effect of growing legumes with non-legumes had been realised for hundreds of years, but only recently has research shown that this is because bacteria present in nodules on the roots of legumes take up atmospheric nitrogen and convert it into materials that can be utilized by plants.

A small number of types of harmful micro-organisms have been a dominant factor in the history of mankind in spite of their microscopic size. Their characteristic of producing disease has been called pathogenicity, so we say that *Brucella abortus* is a pathogen or a pathogenic bacterium and that Brucellae are pathogenic bacteria.

The severity of an infectious disease depends on many factors but one of the most important is the ability of the organisms to enter the body, grow and produce harmful effects. The term virulence has been coined to denote this ability and so a pathogenic bacterium may vary in the degree of virulence it possesses. The highly virulent organism will produce a severe, often fatal, disease.

The microbiological laboratory must be able to isolate the different organisms and then identify them to determine whether pathogens are present.

VIRUSES

The smallest organisms are called *viruses.* At one time, the term virus was used to denote any infective agent but further investigation has shown that the name should only be used in the restricted sense used here.

Viruses are so small that they will pass through filters which will hold back bacteria and they cannot be seen under the ordinary microscope. This latter characteristic and the necessity for them to have living cells in which to grow retarded recognition and study of this group.

Most of the major animal diseases are caused by viruses but fortunately Australia is free of them. Such diseases are rabies, rinderpest, foot and mouth disease and Newcastle disease. The foothold that several of these have obtained in past years was vigorously and successfully opposed by slaughter and disinfection procedures employed rigorously by our forefathers in their wisdom.

Table 1 is a list of viral diseases known to occur in Queensland animals. Undoubtedly more will be added to the list in the future. The isolation of these organisms involves highly technical procedures which are relatively costly. A glance at the list shows another important characteristic of viruses and this is their adaptation to a single host. For instance infectious laryngotracheitis occurs in fowls and pheasants, not in other birds or animals. This high degree of host specificity is advantageous for, if it was not so, man and animals would be exposed to many more infectious agents.

TABLE 1

VIRAL DISEASES OCCURRING IN ANIMALS IN QUEENSLAND

Name of Disease	Host (s)
Contagious pustular dermatitis (" scabby mouth ")	Sheep
Ephemeral fever ..	Cattle
Warts	Cattle
Virus pneumonia ..	Pigs
Swine pox	Pigs
Distemper	Dogs
Contagious Hepatitis ..	Dogs
Myxomatosis	Rabbits
Leucosis	Fowls
Avian encephalomyelitis	Fowls
Fowl pox	Fowls, turkeys
Infectious laryngotracheitis	Fowls
Psittacosis	Cage birds
Q-fever	Cattle

From a scientific aspect, however, host specificity has its disadvantages for the cost of research increases tremendously when large animals such as cattle must be used in research. This has been the case in poliomyelitis of man, where the present highly favourable position was only obtained by the sacrifice of a huge number of monkeys which are the only animals besides man susceptible to the viruses that cause poliomyelitis.

Some viruses also possess the characteristic of growing only in certain tissues of the host. For example, contagious pustular dermatitis, or "scabby mouth" as it is commonly called, is a disease of the skin and is most commonly seen affecting the areas around the lips of sheep. Other skin areas such as the udder may also be affected but no lesions are seen inside the sheep. This characteristic is often used in vaccination methods, as, for example, a mild infection on the inside of the thigh of a lamb is produced to immunize it against infection in the mouth region.

Until recently most vaccination techniques against virus diseases used living or weakened viruses. The now famous Salk vaccine for poliomyelitis is a dead vaccine and its successful use has shown that efficient dead viral vaccines can be made, although the process may be costly.

Except for those organisms belonging to the psittacosis group, the viruses are resistant to antibiotics. Treatment is therefore not easy.

RICKETTSIA

Larger organisms but still dependent on living cells are those called *Rickettsia.* Only two rickettsial diseases have so far been recognised in Queensland in domestic animals although man is the casual host of many. Q-fever, which occurs in cattle, and pink-eye or "blight" of sheep, are attributed to a Rickettsia.

PLEUROPNEUMONIA ORGANISMS

Larger than the Rickettsia and no longer requiring living cells are those organisms belonging to the pleuropneumonia group. One of the earliest animal diseases recognised to be caused by a living agent was contagious agalactia of goats, which is caused by a pleuropneumonia organism. Of greater importance is the member of this group named *Mycoplasma mycoides,* which is the cause of bovine contagious pleuropneumonia. This is one of the most important cattle diseases in this country as it not only causes sickness and death, but has meant restriction on cattle movements within Australia and to

TABLE 2

BACTERIAL DISEASES OCCURRING IN ANIMALS IN QUEENSLAND

Name of Disease	Name of Organism	Main Host
Blackleg	*Clostridium feseri* (*Cl. chauvoei*) ..	Cattle, sheep
Enterotoxaemia (Pulpy kidney)	*Clostridium welchii*	Sheep
Malignant oedema	*Clostridium septicum*	Sheep
Tetanus	*Clostridium tetani*	Sheep, pigs, horses
Botulism	*Clostridium botulinum*	Cattle, birds
Tuberculosis	*Mycobacterium tuberculosis* ..	Cattle, pigs
Caseous lymphadenitis ..	*Corynebacterium ovis*	Sheep
Erysipelas	*Erysipelothrix rhusiopathiae* ..	Sheep, pigs
Listeriosis	*Listeria monocytogenes*	Sheep
Actinomycosis (lumpy jaw) ..	*Actinomyces bovis*	Cattle
Actinobacillosis (wooden tongue)	*Actinobacillus lignieresi*	Cattle
Mycotic dermatitis	*Dermatophilus dermatonomus* ..	Cattle, sheep, horses
Melioidosis	*Pseudomonas pseudomallei* ..	Sheep, goats, pigs
Coryza	*Haemophilus gallinarum*	Fowls
Brucellosis	*Brucella abortus*	Cattle
Brucellosis	*Brucella suis*	Pigs
Brucellosis	*Brucella ovis*	Sheep
Fowl cholera	*Pasteurella septica*	Fowls
Pasteurellosis	*Pasteurella septica*	Birds, sheep, cattle, pigs
Salmonellosis	Numerous species of *Salmonella* ..	Most animals and birds
	Actinobacillus equuili	Horses
Vibriosis	*Vibrio fetus*	Cattle
Leptospirosis	*Leptospira pomona* and *L. hyos* ..	Cattle, pigs
Avian spirochaetosis	*Borrelia anserina*	Fowls
Mastitis	*Streptococcus agalactiae*	Cattle
Mastitis	*Streptococcus dysgalactiae*	Cattle
Mastitis	*Streptococcus uberis*	Cattle
Mastitis	*Staphylococcus aureus*	Cattle and sheep
Mastitis	*Corynebacterium pyogenes*	Cattle and sheep

other countries. This disease has been eradicated from many countries.

Two other members of this group are known to cause disease in Queensland. One occurs in goats and the full importance is not known and the other is thought to be the cause of chronic respiratory disease of poultry. Study of this group of organisms is still in its infancy.

BACTERIA

By far the largest number of pathogens belong to the group of micro-organisms we know as bacteria. Table 2 demonstrates fully the importance of bacteria as the cause of disease. One famous American scientist has calculated that milk production is 23 per cent. lower on farms with brucellosis in the dairy herd than in those herds free of this bacterial disease. Such figures surely illustrate how financially rewarding would be the eradication of brucellosis.

Bacteria vary in shape and size considerably. They can be grown in non-living materials but they differ tremendously in their food requirements. Some require simple chemical substances, others must have complex substances including vitamins and trace elements. As their nutritional requirements are diverse so also are the methods by which they affect animals.

At one extreme we have the bacterium *Clostridium botulinum* which does not even have to enter the body to exert its effects, as the poison, or more correctly the toxin, is produced in rotting vegetation or carcases and on ingestion by the animal is able to poison the nervous system to give the disease known as botulism.

Other bacteria, as for example the tetanus bacillus, grow in a localised region of the body but produce a toxin that spreads throughout the tissues.

Quite a number of pathogenic bacteria have the ability to enter the body and if they are not defeated by local body defence mechanisms spread throughout the body and so disrupt the normal body processes that death results. Examples of this type are the bacteria causing erysipelas and salmonellosis. Such organisms usually produce a fevered carcass.

Another division of bacterial pathogens are those that remain localised, rarely cause death but lead to decreased production and growth. All dairy farmers are familiar with representatives of this group, namely the bacteria causing mastitis. Fortunately, many bacterial diseases can be controlled by vaccines, antibiotics and good husbandry.

FUNGI

The fungi are of more complex structure than the bacteria. They are readily seen under the microscope and are capable of growth on non-living materials. In fact, most people are aware of fungi as mushrooms and moulds growing on stale

TABLE 3

FUNGAL DISEASES OCCURRING IN ANIMALS IN QUEENSLAND

Name of Disease	Name of Fungus	Host
Aspergillosis	*Aspergillus fumigatus*	Fowls
Moniliasis (thrush)	*Candida albicans*	Birds
Ringworm	*Microsporum* spp. *Trichophyton* spp.	Cattle, horses, dogs

TABLE 4

SOME PROTOZOAL DISEASES OCCURRING IN ANIMALS IN QUEENSLAND

Name of Disease	Name of Protozoa	Host
Piroplasmosis (babesiosis) (redwater or tick fever)	*Babesia bigemina*	Cattle
	Babesia argentina	Cattle
Trichomoniasis	*Trichomonas foetus*	Cattle
Histomoniasis (blackhead)	*Histomonas meleagridis*	Turkeys, fowls
Coccidiosis	*Eimeria tenella*	Fowls
	Eimeria necatrix	Fowls
Toxoplasmosis	*Toxoplasma gondii*	Dogs, bandicoots, rats

bread. Table 3 lists those fungal diseases known to occur in Queensland. These are often diseases of the external body surfaces. Therapeutic agents are available for these diseases but treatment is often a long-term process.

PROTOZOA

Lastly we have the group of micro-organisms known as *protozoa.* These organisms are complex in life history and variety. The important protozoal diseases are listed in Table 4. Only a few can be cultivated outside the living body, and whereas all the other groups of pathogens are usually considered to belong to the plant kingdom, protozoa belong to the animal kingdom.

Mixed Infections

The major groups of pathogens have each been considered separately, but it does not follow that such is the case in nature. It is not unusual to find two pathogens

Plate 4

Fungi Inoculating Hood Being Used for the Handling of Fungi Behind Glass to Prevent the Spread of Infection.

of the same or different types in the one animal. For instance, pneumonia of pigs probably starts with a viral infection but bacterial pathogens quickly invade the weakened lung tissue and may eventually be the real cause of death. In such cases accurate laboratory diagnosis is particularly important.

Pathogenic micro-organisms may seem too numerous for us to contemplate complete control over them, but the more we know of them and their distribution in our livestock the better does our control become.

(To be Continued)

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Stock And Station

Beat Tetanus with Good Hygiene.—Improved hygiene around sheep yards and shearing sheds will do much to reduce the toll of tetanus. This widespread disease is responsible for deaths ranging from a few sheep to several hundred.

Tetanus usually occurs after routine sheep work. At shearing, crutching, lamb marking, mulesing, and on dipping heavily grass-infested sheep, the animals can pick up tetanus germs. These germs often live for years in the soil around shearing sheds, dips and sheep and horse yards. Infection takes place through wounds, especially deep ones. When it has gained entrance, the tetanus germ produces a poison that affects the nervous system. It is generally fatal.

Tetanus is very difficult to cure, so it's better to prevent it. Before shearing and crutching, the board should be scrubbed with disinfectant and the counting out pens cleaned. Lamb marking and mulesing tools should be dipped in a disinfectant solution regularly during these operations.

If tetanus occurs after lamb marking and mulesing, be warned and next time mark the lambs in temporary yards well away from the infected area. In any case, temporary lamb marking yards are an advantage. Besides being removed from the heaviest sources of infection, they allow you to drop the lambs onto clean grass after the operations.

Sheep can be inoculated to give them immunity from tetanus, and for all sheep, especially valuable rams and show stock, this may be worthwhile. Two injections 12 months apart will ensure life-long protection.

—A. T. BELL,
Director of Sheep Husbandry.

Keep Pleuro in Check.—Queensland cattlemen are getting on top of pleuro, but only regular inoculation will keep the disease incidence low. Graziers should not neglect pleuro inoculation in their herds this year.

Extensive inoculation programmes undertaken by many property holders in the last few years have sharply reduced the number of pleuro cases reported. On most of these properties, fewer than one per cent. of slaughter cattle have shown evidence of pleuro in the last year or two. Yet five or six years ago, it was common for meatworks' reports to indicate that up to 15 per cent. of cattle slaughtered showed evidence of pleuro.

Although the position is encouraging, pleuro is still present. Any relaxation in herd vaccination will merely invite trouble. Neglecting to inoculate will allow large numbers of animals to become susceptible to pleuro, and a recurrence of the great outbreaks of the late 1940's could easily result.

Deaths, restrictions on stock movements and destruction of infected animals make pleuro one of Queensland's most serious cattle diseases. But regular vaccination will protect your herd against it. Don't miss vaccinating your young stock every year. Combined with the vaccination of all older cattle every two or three years, this is a good insurance against future outbreaks.

—K. M. GRANT,
Assistant Director of Veterinary Services.

Hot Iron Method of Dehorning.—The hot iron method of dehorning calves is popular on many Queensland farms. Chief advantages of this method are that there are no bad after-effects and no after-care is needed.

Dehorning by this method destroys the growing buds at the base of the horn button. The operation is most effective if it is performed when the calf is about 10 days old.

The iron should be heated to a cherry colour and applied over the horn centre. On application, the iron should be twisted, either clockwise or anticlockwise, to give firm contact around the horn base. A copper-coloured ring must be burnt right around the base of the horn.

In the beginning, you may make the mistake of using too little pressure or of not leaving the iron on the horn long enough. Here, experience is your best guide. After the first application of the iron, the calf appears to suffer little pain, so you need not be afraid of burning a deeper ring.

Before starting, clip away the hair around the horn bud. It is convenient to have someone hold the calf, but the whole operation can be done by one man. If working alone, put the calf on the ground and straddle it. With one hand, hold the calf's head securely over your knee and use your other hand to apply the iron.

Electrically heated irons are available, but old soldering irons can be adapted to make irons for heating in a fire. The part of the iron used on the horn consists of a ring of copper around a hollow centre. In use, the centre of the developing horn fits into the hollow of the iron. The copper ring sears a circle around the horn base.

The main inconvenience of this method lies in having to do calves at a particular age. Calves born as little as a week apart would probably have to be dehorned at different times. If you have a lot of calves, you would probably find gouge-type dehorners more suitable.

—*W. F. MAWSON,*
Senior Adviser in Cattle Husbandry.

Milking Capacity of Sows.—When farmers select a breeding sow they usually consider type and prolificacy, but her capacity to produce milk is often overlooked.

Fast litter growth is dependent on the sow's milk production in the first few weeks after farrowing.

The actual amount of milk produced by sows in a lactation has been measured, and varies from 300 to 650 lb. in the 8 weeks. Production varies from day to day, and from one milk gland to another, but the general pattern is an increase in the weekly yield up to the fourth week, then a decrease until weaning.

Piglets usually only take from one-third to one-half of the milk in a sow's milk glands each time they suckle. If their dam is a poor milker then they cannot grow rapidly because they get insufficient food. This is one reason why you should try to select breeding sows from strains known to be good milkers, measured by the production of heavy 3-weeks-old piglets.

The quantity and quality of the food you give a sow affect her milk yield. To get maximum production you must feed her enough of the right types. Insufficient food means lowered milk yield and loss of body weight. Sow's milk goes through two major changes in composition. The first is a rapid change from colostrum to normal milk in the first week after farrowing. Then a gradual change takes place in the percentage of the various constituents, and the critical period is about the third week of lactation, just before maximum yield is reached.

Creep feeding of the litter should be established by this time, because from this stage on you will get more weight increase in the piglets per pound of food if it is fed directly to them rather than to the sow, which has first to convert the food to milk.

If you want fast growing litters you now know why you must select sows which can milk well, feed them properly, and have the litters eating a good creep feed mixture before they are 3 weeks old.

—T. ABELL,
Senior Adviser, Pig Branch

Food Wastage Greatest at the Hoppers.—Officers of the Poultry Section of the Department of Agriculture and Stock have found that feed wastage can be staggering. Control of feed wastage is an avenue by which costs can be reduced.

The type of feed hopper used, and the filling of hoppers too full, are two common causes of feed wastage.

Studies have revealed that even with good trough-type hoppers, filling them to the brim will cause feed wastage as high as 33⅓ per cent.

If the same hoppers are only half-filled, feed wastage is reduced to a mere 2 per cent.

The fowl won't save feed, but the alert farmer can, by the way he controls the feeding of his birds.

—C. W. TUTT,
Poultry Adviser.

Timely Tips for November

In areas where blackleg has occurred in the past, November may be the best month to vaccinate for blackleg. If you haven't done it before, write for a pamphlet on the subject.

Worms work by the weather. Warmth and rain in November may cause an upsurge of worm activity. Be prepared to treat about three weeks after rain if the condition of your animals warrants it. What to treat with is important, especially with modern remedies becoming available.

If animals are put back into the same paddock after treatment, they are likely to pick up a lot of worm larvae from the infested environment. Arrange to put them into a paddock that has been spelled for three weeks. Most of the larvae will have died out by then.

If November is dry and it is a long time (over 3 months) since pigs have had adequate green feed, a dose of vitamin A concentrate will help maintain good growth and health. But succulent green feed is the best source of all vitamins for pigs.

Cyanide poisoning may occur this month. Be careful when animals are grazing crops of plants known to be cyanide producers. Have supplies of "hypo" on hand. Prompt treatment of affected animals saves a lot of lives. Watch for excitement, rapid breathing, tremors, blue membranes and sudden collapse.

Calves may be at a good age this month for Strain 19 vaccination.

Brucellosis-Tested Swine Herds (As at 1st October, 1959)

Berkshire

Astbury, "Rangvilla", Pechey
Clarke, E. J., Mt. Alford, via Boonah
Cochrane, S., "Stanroy", Felton
Cook, F. R. J., Middle Creek, Pomona
Crawley, R. A., Rockthorpe, Linthorpe
Edwards, C. E., "Spring Valley" Stud, Kingaroy
Farm Home For Boys, Westbrook
Fletcher, A. C., "Myola" Stud, Jimbour
French, A., "Wilson Park", Pittsworth
Grayson, D. G., Killarney
H. M. State Farm, Numinbah
H. M. State Farm, "Palen" Stud, Palen Creek
Handley, J. L., "Meadow Vale", Lockyer
James, I. M. (Mrs.) "Kenmore" Stud, Cambooya
Kimber, E. R., Block 11, Mundubbera
Law, D. T., "Rossvill" Stud, Aspley
Lees, J. C., "Bridge View" Stud, Yandina
Ludwig & Sons, A. R., "Beau View" Stud, Beaudesert
McLennan, G. J., "Murcott" Stud, Willowvale
O'Brien & Hichey, J., "Kildurham" Stud. Jandowae East
Orange, L. P., "Hillview", Flagstone Creek
Pfrunder, P. L., Pozieres
Pick, L., Mulgildie
Potter, A. J., "Woodlands", Inglewood
Puschmann, L., "Tayfield" Stud, Taylor
Q.A.H.S. & College, Lawes
Regional Experiment Station, Hermitage
Rosenberger, N., "Nevrose", Wyreema
Schellback, B. A., "Redvilla" Stud, Kingaroy
Smythe, E. F., "Grandmere" Stud, Manyung, Murgon
Stark, H. L., "Florinda" Stud, Kalbar
Thomas & Sons, F., "Rosevale" Stud, Laravale
Traves, G., "Wynwood" Stud, Oakey
Weier, V. F., "La Crescent", Clifton
Wolski, A., "Carramana", Warra
Young (Jnr)., W., Kybong, via Gympie

Large White

Assenbruck, C., Mundubbera
Barron Bros., "Chiltern Hill", Cooyar
Bell & Son, E. J., "Dorne", Chinchilla
Butcher, Dr. B. J. & Parnwell, A. J. Plunkett, via Tamborine
Clark, L. D., Greens Creek, Gympie
Duncan, C. P., "Hillview", Flagstone Creek
Fowler, S., "Kenstan", Pittsworth
Franke, H. J., "Delvue" Stud, Cawdor
Garrawin Stud Farm Pty. Ltd., 657 Sandgate Rd., Clayfield
Gibbons, A. E. H., Mt. Glorious
Gibson, H., "Thistleton" Stud, Maleny
H. M. State Farm, Numinbah
Hall, M., "Milena" Stud, D'Aguilar
Heading, J. A., "Highfields", Murgon
Horton, C. J., "Mannuem Brae" Stud, Mannuem, Kingaroy
Hutton, G., "Grajea" Stud, Cabarlah
Jensen, S., Rosevale, via Rosewood
Jones, K. B., "Cefn" Stud, Clifton
Kahler, J. & S., East Nanango
Kanowski, A., "Exton", Pechey
Kennard, R. B., "Collar" Stud, Warwick
Larsen, H. L., "Oakway" Stud, Kingaroy
Law, D. T., "Rossvill" Stud, Aspley
Lees, J. C., "Bridge View", Yandina
Lobegeiger, L. C., "Bremer Valley" Stud, Moorang, via Rosewood
Mack, A. J., Mundubbera
Palmer, A., "Remlap", Greenmount
Pampling, G., Watch Box Road, Goomeri
Postle, R., "Yaralla" Stud, Pittsworth
Powell, R. S., "Kybong", Gympie
Q.A.H.S. & College, Lawes
Radel, V. V., Coalstoun Lakes
Regional Experiment Station, Biloela
Robinson, O. R., & O. J., "Linvale", Argoon, Biloela
Skyring, G. I., "Bellwood" Stud, via Goomeri
Stanton, H. R., "Tansey" Stud, via Goomeri
Stewart, L., Mulgowie, via Laidley
Stumer, K. F., French's Creek, Boonah
Wharton, C. A., "Central Burnett" Stud, Gayndah
Wieland, L. C. & E., Lower Cressbrook, Toogoolawah
Zahnow, W., Rosevale, via Rosewood

Tamworth

Armstrong, H. J., "Alhambra", Crownthorpe, Murgon
Booth, J. D., Swan Creek, Warwick
Campbell, P. V., "Lawnhill" Stud, Lamington
Coller, R. H., Tallegalla, via Rosewood
Fletcher, A. C., "Myola" Stud, Jimbour
Herbst, L. "Hillbanside", Bahr Scrub, Beenleigh
Kajewski, W., "Glenroy" Stud, Glencoe
Kanowski, S. E., "Miecho", Pinelands
Potter, N. R., "Actonvale" Stud, Willcamp
Regional Experiment Station, Kairi
Salvation Army Training Home For Boys, "Canaan" Stud, Riverview
Skerman, D. F. L., "Waverley", Kaimkillenbun
Stephens, T., "Withcott" Stud, Helidon
Thomas & Sons, F., "Rosevale" Stud, Laravale
Wieland, L. C. & E., Lower Cressbrook, Toogoolawah

Wessex Saddleback

Ashwell, J., "Green Hill", Felton South
Burnett, G. C., "Rathburnie" Stud, Linville
Cooper, G. J., Neumgua
Douglas, W., "Greylight" Stud, Goombungee
Dunlop, J. B., "Kunawyn", Acacia Road, Kuraby
Kruger & Sons, "Greyhurst" Stud, Goombungee
Law, D. T., "Rossvill" Stud, Aspley
Mack, A. J., Mundubbera
Scott, A., Wanstead Stud, Grantham
Smith, C. R., "Belton Park", Nara
"Wattledale" Stud, 432 Beenleigh Road, Sunnybank

Large Black

Pointon E., Goomburra

Growing Summer Vegetables In North Queensland

By S. E. STEPHENS, Horticulturist.

The growing of summer vegetables is now an established industry in north Queensland, its success depending on the maintenance of a regular supply to the market selected.

During the early part of this century and, indeed, right up to 1940, vegetables for the north Queensland markets during the summer months were practically all imported from southern Queensland or New South Wales. Regular and frequent refrigerated shipping services maintained supplies of even the most perishable vegetables without difficulty, and these sold at reasonable prices. This system of supply was so well organised that farmers in north Queensland found local production uneconomic. Pests and diseases are very active in summer, and climatic conditions at that period of the year make the production of good quality vegetables far from easy.

The War Time Pattern

The disorganisation of shipping brought about by the second World War caused a complete breakdown in the established supply arrangements and local production was expanded to meet local needs. These were increased some four or five fold by the billeting of large concentrations of army, navy and air force personnel within the area. Furthermore, the establishment of a number of military hospitals and convalescent centres in the north necessitated a regular supply of large quantities of salad vegetables in particular.

Production of vegetable crops during the winter months, which had been a normal practice for many years, was stepped up to meet the increased demand and, since the demand was continuous and the prices offered were attractive, farmers attempted to extend the production period into the summer. It was soon found that, even on the coastal plain, some vegetables could be grown as late as Christmas while in the Tableland areas, particularly outside the heavy rainfall belt, vegetables could be grown right through the summer months.

The Post-War Period

In the course of the succeeding decade, a clearer picture of the possibilities in various localities gradually emerged.

For commercial purposes, the coastal plain is suitable only for winter and early spring production of vegetable crops. Long beans and cucumbers are exceptions to this rule, for both can be grown during the summer months also. Occasionally, French beans and tomatoes may be harvested as late as January but, at that time, both are unreliable crops; yields are often low and pests and diseases constitute serious hazards.

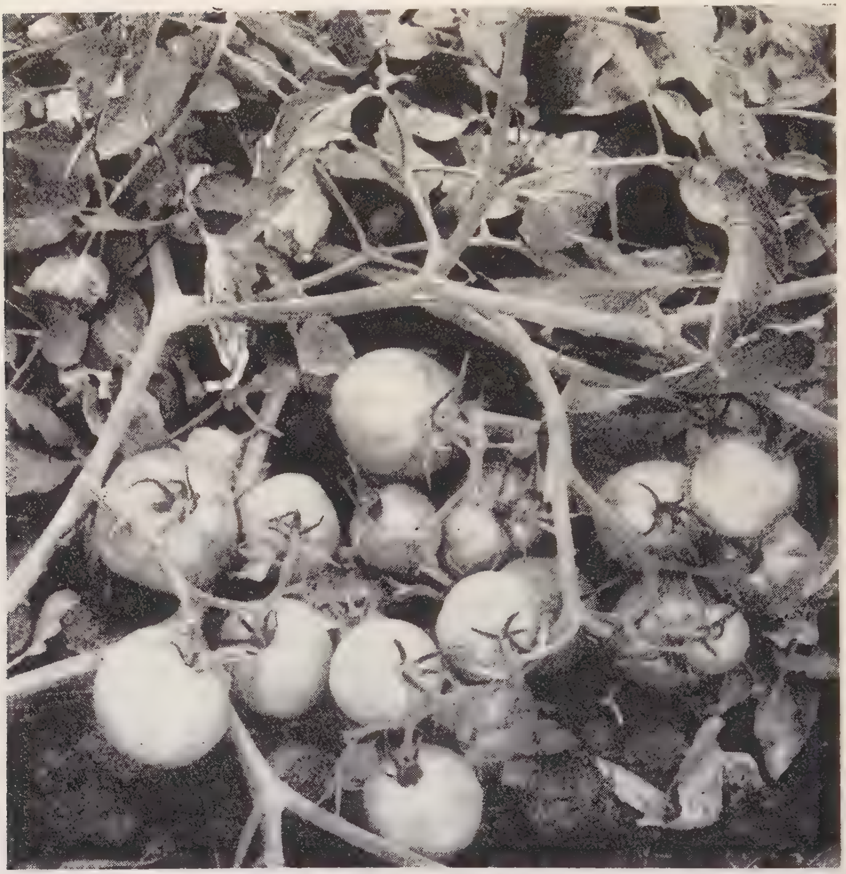

Plate 1

Tomato Fruit. Interior of the bush exposed to show the heavy fruit set in winter-grown crops of North Queensland.

At medium altitudes between 1,000 and 1,400 ft. where frosts are not normally encountered, vegetable crops may be grown not only in the winter and early spring but also in autumn, late spring and early summer. At this altitude, strictly temperate vegetables like green peas and cauliflowers may be grown successfully only during the winter period but the more heat-tolerant crops like beans and tomatoes may be grown both in autumn, winter and early summer. Land at this elevation has been the main source of local vegetable supplies in the north for many years and it is in such areas that the greater number of full-time vegetable farmers are found.

The higher altitudes above 2,500 ft. open up the most interesting possibility for vegetable growing in the tropics. Though situated within a few degrees of the equator, mean temperatures differ from those of the Granite Belt in southern Queensland by only a few degrees F. and stone fruits and grapes can be grown with reasonable success. It would be expected therefore that summer vegetable production would show some of the characteristics of the Granite Belt in southern Queensland. And this indeed is so, even though present production in the north is on a more restricted scale.

The Tablelands

The principal areas concerned are parts of the Atherton Tableland, and the Evelyn Tableland. The soils are chiefly red basaltic loams but small pockets of alluvium are also used. They are well-drained, of good structure and stand up well to cultural practices required by vegetable crops. Their nutrient status has no abnormal features and where standard fertilizer practices are adopted, no serious deficiency problems have been recorded.

The areas preferred for summer vegetable production are on the fringe of the high rainfall belt that covers the eastern part of the Tablelands. They experience a comparatively short wet season and, consequently, irrigation is necessary for successful crop production. Many farms draw water for irrigation from surface streams but at least one—and, incidentally, this is probably the largest single vegetable farm in Queensland, with up to 300 acres under crop—depends upon several large earth dams for irrigation.

Large scale vegetable production requires careful organisation and, on the Tableland, the best results have been obtained by specialisation. The maintenance of seedling supplies is the responsibility of a nurseryman employed for that purpose alone. Land preparation for planting in the field is the responsibility of another man or men. Each vegetable or, sometimes, a group of two or three similar vegetables,

Plate 2

French Beans Grown Under Irrigation. The crop thrives in North Queensland in late autumn, winter and spring.

is allotted to one man who specialises in growing it. Marketing of the produce is another separate problem and is handled by a senior member of the organisation—usually the proprietor.

These methods are practiced by at least two large growers in Tableland areas. They presuppose a high degree of organisational skill for all operations must be dovetailed so that no delays occur in the production programme and adequate supplies are continuously available to meet the market demand.

Distribution

The more important markets from Townsville northward are now receiving summer vegetables from the Tablelands but the quantities available only meet a fraction of the current demand. Large quantities are still brought forward from Brisbane.

Superficially, it might appear that any farmer with suitable land in Tableland areas who specialised in summer vegetable production should be able to command a good income. In actual fact, however, success or failure depends on his ability to maintain regular supplies to the market he selects. The wholesale and retail vegetable markets have an obligation to maintain reasonable supplies to the consumer at all times of the year. When locally grown vegetables are scarce, market operators make arrangements for supplies from southern wholesale markets. Should unexpected deliveries from local sources meet a market already well supplied from the south, they might only be sold with difficulty.

During the transition period from sparse local supplies to plentiful and regular supplies from the south, any northern grower who enters the summer vegetable growing business must organize his markets very carefully and well in advance of harvest.

Zinc Deficiency In Citrus

Mottle-leaf—a common nutritional disorder in Queensland citrus orchards—is due to a deficiency of zinc. The foliage assumes a characteristic mottling—or yellowing between the lateral veins—and the trees present a generally unthrifty appearance. The leaves tend to be small and narrow with a bunched, upright growth habit, and twig dieback occurs.

The overall effect of zinc deficiency is a weakening of foliage growth, and fruit drop may increase to abnormal proportions.

Foliage sprays containing zinc sulphate will correct the deficiency. The recommended spray mixture is 10 lb. of zinc sulphate plus 3¾ lb. of soda ash in 100 gal. of water. The spray can be applied at any time when tree symptoms tell the story, but it is most effective when applied in the spring. The spring application can be combined with the copper fungicidal sprays usually applied at blossom-fall.

Even on healthy orchards, an annual zinc spray at half-strength is desirable and is recommended.

—D. DOWDLES,
Adviser in Horticulture.

Sheepmen Deal With Predators

A Young Dingo Reared from Puppyhood by a Sheepman. The observation of live dingoes can give sheepmen much information on the habits of these sheep killers.

Caged Poultry Used As a Decoy for Eagle Destruction. Note the dingo traps set around the cage. In contrast with dingoes, eagles take little notice of exposed traps, and are easily caught in them.

Orchard And Garden

Controlling Pests of the Cabbage Family.—Experience has shown that in Queensland it is almost impossible to grow cabbages, cauliflowers, broccoli and some other members of the cabbage family without using methods to control insect pests. The pests are mainly caterpillars and aphids.

As the insects attack the plants at all stages of growth, controls are required in the seedbeds and in gardens and fields.

Weekly sprayings of seedbeds with endrin at a concentration of 0.025 per cent. active ingredient are recommended. Should aphids appear, an additional treatment with benzene hexachloride (BHC) at 0.03 per cent. gamma isomer should be given. Spray immediately before lifting from the seedbed to ensure that clean material is planted out.

Transplants should be sprayed with endrin at a concentration of 0.025 per cent. active ingredient soon after setting out, and spraying should be repeated at fortnightly intervals. If endrin is not available, dieldrin at a concentration of 0.05 per cent. active ingredient may be substituted.

When aphids are present, a BHC spray at a concentration of 0.03 per cent. gamma isomer should be used instead of one of the fortnightly treatments with endrin or dieldrin.

Discontinue spraying at least a fortnight before harvesting.

—B. R. CHAMP,
Entomologist.

Oil Sprays and Orange Trees.—Oil sprays are recommended as the standard control for several species of scale insects occurring in Queensland, especially on citrus. In commercial orchards the best time to apply these sprays is in the summer. There are two main reasons why the applications should be made at this time. Firstly, the summer generations of scale insects are large, they have a high percentage of survival and the young insects move to the younger parts of the trees as well as onto the fruit. Secondly the oil sprays for citrus are formulated specially for use in summer.

Occasions could arise where one or more of the scale species has bred to unusual numbers at other times of the year. Under Queensland's climatic conditions some advantage may be obtained by using an oil spray at these times. In the spring, however, orange trees are at the critical stage of flowering and setting fruit and may react to oil sprays made in this period by dropping the flowers or shedding the young fruit.

—A. R. BRIMBLECOMBE,
Senior Entomologist.

Carrot Weedicides.—Now that we have white spirit and kerosene sprays, weed control in carrots is not the backbreaking, soul-destroying job it used to be.

Two sprays are usual.

The first, a spray to destroy weeds germinating before the carrots. Make certain of this point, *before* the carrots germinate, say about 4 days after sowing. Apply the spray when the carrots are germinating and you certainly kill the weeds—*but you kill the carrots, too!*

This pre-germination spray is usually white spirit.

The second spray can be white spirit or a mixture of lighting and power kerosene. *The time* to use it is when the plants are in the 4 fern-leaf stage. Power kerosene varies in composition so it's a good plan to pre-test part of a row the day before full treatment. One part of lighting kerosene to four parts of power kerosene is a suitable basis to work on. If this damages the tested plants, add more lighting kerosene until the mixture is both safe and effective.

Preferably, spray the carrots in the cooler, late afternoon to minimise chances of burn and plant injury. Only a light spray is required—35 gal. to the acre for double rows and 20 gal. for single rows.

—*D. DOWDLES,*
Adviser in Horticulture.

Clean Containers for Produce.—The presentation of fruit and vegetables is a very important item to the farmer who wants to get top prices for his produce.

Lettuces grown in the metropolitan area are usually marketed in one bushel cases. While the use of second-hand cases is permissible, some growers are abusing this concession by using dirty cases, some even with soil or other offensive foreign matter on them.

Many growers fail to remove the old brands from their cases and do not mark them with their own name and address as required by the Grading and Packing Regulations.

Market inspectors have been directed to take action against persons selling lettuces in dirty cases and therefore any grower who continues to do so will have his produce withheld from sale until the lettuces are repacked into clean cases which are properly branded.

Suitable types of waterproof plastic labels now available in Queensland are priced at approximately 1½d. each, and are easily attached to the case. This type of label would be acceptable for use on lettuce cases in terms of the Fruit and Vegetables Acts.

—*A. J. CROCKER,*
Senior Market Inspector.

Tree Spacing in Citrus Orchards.—How many citrus trees can you plant to the acre? . . . 50? . . . 100? The objective, of course, is to grow good trees and good crops of fruit. The trees must have enough room for top and root development. You must allow for inter-tree space to provide access for implements, spray equipment, and so on. And last but not least, there's the moisture problem.

Certainly, when you have no irrigation water, a wide tree spacing of up to 30 ft. x 30 ft. is essential, and you're limited to 50 trees to the acre.

But if you have the water, 20 ft. x 20 ft. (or say 24 ft. x 17 ft.) is ample. This way you get over 100 trees to the acre . . . medium-sized, undoubtedly, but with a high potential for early production.

As a general rule, 100 trees to each acre of orchard is not an over-crowded planting rate, and the trees are quite manageable.

One reminder! For regular cropping, you *must* have that supplementary irrigation water!

—*D. DOWDLES,*
Adviser in Horticulture.

STAPYLTON

A Queensland Fauna Sanctuary

By C. ROFF, Fauna Officer.

The marshlands near Beenleigh have been the popular haunt of waterfowlers since early days. The gradual build-up of population in South-East Queensland, resulting in an increase in the number of hunters and a more intensive use of land in this area, however, has required consideration to be given to conservation of the game species that were being affected adversely.

Accordingly, in conjunction with those local residents who showed interest, an area of 3,926 acres of swampland at Stapylton was selected as a waterfowl sanctuary in 1949.

The principal waters of this sanctuary arise from Sandy, Bridge and Halfway Creeks which, at the anabranch of Sandy Creek, spill into wide swamplands. These are fringed by extensive tea-tree forests on the eastern and southern margins.

The sanctuary is situated 26 road miles south-east of Brisbane, and is reached by journeying along the

Plate 1
Stapylton, a Queensland Fauna Sanctuary.

Pacific Highway, then turning coastwards two miles past Stapylton in the direction of Norwell.

In 1949, when only a few black swans and small numbers of other wild ducks and wading birds inhabited the swamps, a survey indicated that the area, under suitable management, would provide the permanent food, water and shelter necessary for any wildlife refuge.

Today, the Stapylton Fauna Sanctuary is noted for its magnificent flights of ducks, swans, ibis and spoonbills. Occasionally the graceful jabiru is to be found feeding in the shallows. It is a feeding and resting area for black ducks, white-eyed ducks, grey teal, maned geese, black swans, yellow-billed spoonbills, white-faced herons and Australian white ibis, some of which breed there. Other fauna found commonly there include plovers, egrets, grebes, cormorants, darters, rosellas, eagles and harriers. Snakes are present, the red-bellied black snake being quite common.

On the higher parts of the land, the vegetation comprises grey ironbarks, swamp mahogany, and an occasional scrub-box. Nearer the water are swamp oaks standing in dense couch and other grasses.

In the swamps, the grasses give way to sedges, rushes and water couch. Wildflowers such as water buttercups, water snowflakes and blue water lilies add colour to the surface of the water. The water birds obtain their food from these plants and the smaller animal species of the swamp.

Management of this sanctuary is largely prevention of hunting and shooting, and a number of resident honorary protectors are active.

SCIENTIFIC NAMES OF FAUNA AND FLORA

Fauna

Australian white ibis	*Threskiornis molucca* Cuvier.
Black duck	*Anas superciliosa* Gmelin.
Black snake	*Pseudechis porphyriacus* Shaw.
Black swan	*Cygnus atratus* Latham.
Cormorant	*Phalacrocorax varius* Gmelin.
Darter	*Anhinga novae-hollandiae* Gould.
Eagles	*Haliastur spenurus* Vieillot. *Haliaeetus leucogaster* Gmelin.
Egret	*Egretta alba* Linnaeus.
Grebe	*Podiceps ruficollis* Urseg.
Grey teal	*Anas gibberifrons* Muller.
Harrier	*Circus approximans* Peale. *Circus assimilis* Jardine and Selby.
Jabiru	*Xenorhynchus asiaticus* Latham.
Maned goose	*Chenonetta jubata* (Latham).
Plover	*Lobibyx novae-hollandiae* Stephens.
Rosella	*Platycercus adscitus* Latham.
White-eyed duck	*Aythya australis* (Eyton).
White-faced heron	*Notophoyx novae-hollandiae* Latham.
Yellow-billed spoonbill	*Platalea flavipes* Gould.

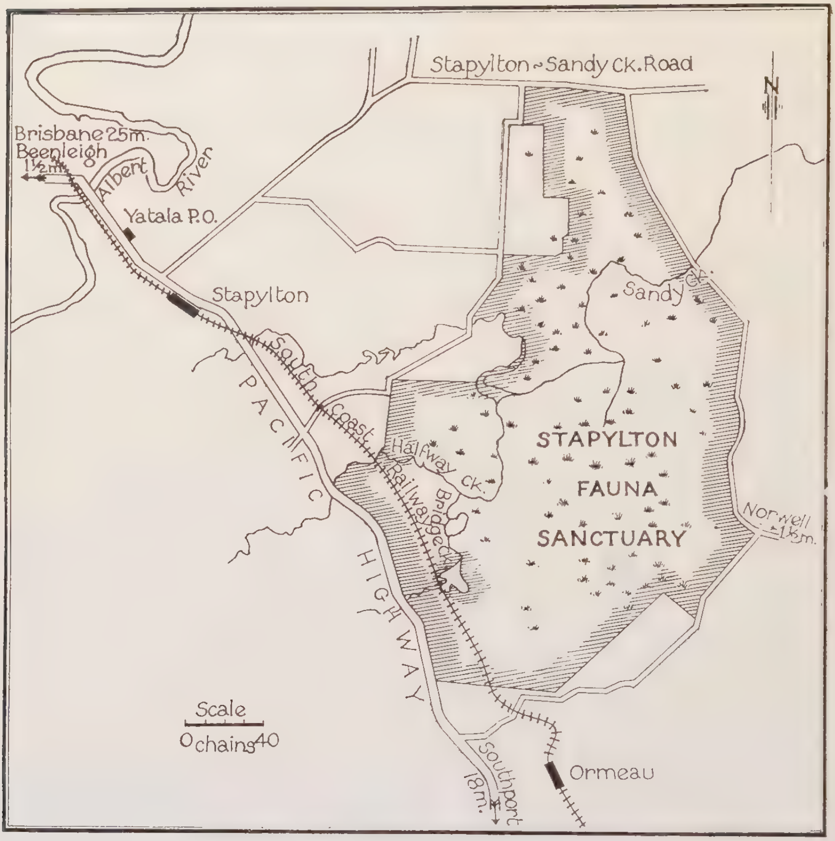
Stapylton~Sandy Ck. Road
N
Brisbane 25m.
Beenleigh 1½m.
Albert River
Yatala P.O.
Stapylton
South Coast Railway
PACIFIC HIGHWAY
Halfway Ck.
Bridge Ck.
Sandy Ck.
STAPYLTON FAUNA SANCTUARY
Norwell 1½m.
Scale
0 chains 40
Southport 18m.
Ormeau

Plate 2

Map Showing the Stapylton Fauna Sanctuary.

Flora

Blue water lily	*Nymphaea capensis* Thunb.
Couch grass	*Cynodon dactylon* (L.) Pers.
Grasses	*Hemarthria* sp.
Grey ironbark	*Eucalyptus drepanophylla* F. Muell. ex Benth.
Rushes	*Juncus* sp.
Scrub-box	*Tristania conferta* R. Br.
Sedges	*Eleocharis equisetina* Presl
	Lepironia articulata (Retz) Domin
Swamp mahogany	*Tristania suaveolens* (Gaertn.) Sm.
Swamp oak	*Casuarina glauca* Sieb.
Tea-tree	*Melaleuca quinquenervia* (Cav.) S. T. Blake.
Water buttercup	*Jussieua repens* L.
Water couch	*Paspalum distichum* L.
Water snowflake	*Nymphoides indica* (L.) O.K.

THE FARM FAMILY

Meat And Poultry Grills

Tender cuts of beef steak such as fillet, rump, sirloin, and porterhouse are suitable for grilling. The meat should not be too fresh and should be cut at least 1 in. thick. Pan grilling is more suitable for thin steaks, as they will not brown under direct heat in the short time required to cook them.

As toughness of meat is associated with the amount of connective tissue present, all steaks, with the exception of fillet, will be improved by beating with a spiked meat hammer or the edge of a saucer.

Treatment before cooking with one of the special "meat tenderisers" will also make steak more tender. These tenderisers usually contain dried papaya juice, which acts on the connective tissue and softens it.

Chops (Lamb or Mutton)

Loin chops are most generally used for grilling, but chump chops are also suitable. Excess fat should be trimmed off and the outer edge of the remaining fat cut at intervals to prevent the chop curling during cooking. The bone may be removed and the chop neatly shaped and secured into position with a small skewer.

Marinade.—To improve the flavour and also to increase their tenderness, steak or chops may be soaked in a marinade. This consists of an acid such as vinegar which is usually combined with oil, seasonings, and herbs.

Bacon

Grilled bacon should be crisp but not brittle. To prepare it, cut off the rind, arrange the slices on the rack of the grilling pan, and place the rack 3 in. below the heat. Turn once during cooking. Remove when the bacon is light brown and crisp.

Kidneys

Sheep or lamb kidneys are suitable for grilling. Skin the kidneys and remove the core. Brush with oil or melted butter. As kidneys are small and may slip through the griller rack, they can be cooked more easily if threaded on a metal skewer. They should not be overcooked, as they tend to toughen.

Pork and Veal

Methods other than grilling are considered better for pork and veal. However, young, tender pork chops may be grilled provided they are very thoroughly cooked. As veal is deficient in fat and has a large amount of connective tissue, it will be more tender if cooked by moist-heat methods.

Poultry

Only very young chickens from six to eight weeks old and weighing about 1 to 1½ lb. are suitable for grilling. The chicken is split in half or cut into suitable-sized portions and brushed well with oil or melted fat. The portions are then placed on the griller rack about 4 in. below the heat. When one side is cooked, salt is sprinkled over the portions turned and brushed with additional fat. The time required will be about 30 to 45 min. If a barbecue sauce is brushed over the portions while they are cooking, it will keep them moist as well as improve the flavour.

MEAT RECIPES

Filet Mignon

Use eye fillet steak cut thick. Preheat the griller. Brush the slices with melted butter or oil and place them on the griller rack about 2 to 3 in. below the heat. Adjust the heat to a moderate temperature. Grill until the top is brown. Season the top with salt and pepper. Turn the meat and grill until the second side is brown. Season the second side. Serve immediately with pan-fried mushrooms, French fried onions, or grilled tomatoes.

Grilled Steak

Use rump, sirloin, or porterhouse steak and grill as for filet mignon. Serve with maitre d'hotel butter.

Maitre d'hotel Butter

2 oz. of butter
1 tablespoon of finely chopped parsley
1 tablespoon of lemon juice
¼ teaspoon of salt
Shake of pepper

Cream the butter, add the parsley, seasonings, and lemon juice. Form into a block and leave the block to harden. Shape into balls with butter pats. (If preferred hot, the butter may be melted and the other igredients added to it.)

Pan Grilled Steak with Oyster Sauce

1 rump steak
Butter or fat
Salt and pepper

Heat a heavy frying pan and lightly grease it with butter or fat. Place the meat in the pan. Adjust the heat so that the meat will cook moderately slowly. Turn occasionally, using tongs or a spatula. Pour off the fat as it collects in the pan. Cook until the outside of the meat is brown and the inside rare or medium done, according to preference. Season and serve immediately with oyster sauce.

Oyster Sauce

6 oysters
1 tablespoon of flour
1 tablespoon of butter
¼ cup of milk
¼ teaspoon of salt
Shake of pepper
1 teaspoon of lemon juice
¼ cup of oyster liquor

Melt the butter, add the flour, salt, and pepper and cook until frothy but not brown. Remove from the heat, add the milk, and stir until smooth. Return to the heat and cook until thick. Remove from the heat, add the oyster liquor, and cook. Cut the oysters into halves or quarters. Add the oysters to the hot sauce and heat gently but do not boil. Remove from heat and add lemon juice. If a richer sauce is desired, add one egg yolk or two tablespoons of cream before adding the oysters.

Hamburg Steaks

1 lb. of mince
2 tablespoons of chopped onion
1 egg
½ cup of fresh bread crumbs
¼ teaspoon of pepper
2 tablespoons of chopped parsley
2 tablespoons of tomato sauce
1 tablespoon of worcester sauce
½ teaspoon of salt

(Five servings)

Saute the onion in a little bacon fat. Beat the egg slightly. Combine all the ingredients and shape into five patties. Wrap a strip of bacon round the outside of each patty and secure with toothpicks. Place on a rack under the preheated griller about 3 in. from the heat and cook at moderate temperature. When half done and brown on top, turn and brown on the other side.

Marinated Lamb Chops

6 lamb loin chops
½ cup of olive oil
¼ cup of vinegar
Juice of 1 lemon
1 bay leaf (crumpled)
½ teaspoon of peppercorns
2 onions (finely minced)
Salt and pepper

Cover the chops with a mixture of the oil, vinegar, lemon juice, and seasonings. Allow to stand in a cool place for two to three hours. Preheat the griller. Remove the chops from the marinade and place on a rack about 3 in. from the source of heat. Regulate the griller so that the chops will cook at a moderate temperature. When the chops are browned on one side, turn and finish cooking on the other side. Time 12 to 15 minutes.

Mixed Grill

A mixed grill consists of two or more kinds of meat grilled with vegetables or fruits. Choose an interesting combination of foods which will require about the same time for cooking or add those which require a shorter time as cooking progresses.

Before beginning, prepare either French fried or straw potatoes or potato crisps and keep hot. Prepare maitre d'hotel butter.

The grill may be selected from the following—

Meat: Steak or chop, kidney, sausage, bacon or precooked sweetbreads.

Vegetable: Mushrooms or tomatoes.

Fruit: Apple rings, pineapple slices, or tinned peaches or apricots.

Place mushrooms or tomatoes in the pan of the griller, where they will cook in the dripping from the meat. Brush the meats with melted butter or fat and arrange on the rack. If using apple rings or fresh pineapple, brush with melted butter. Tinned fruits have sufficient syrup to grill without butter. Place the grill 2 to 3 in. from the heat and cook at moderate temperature.

Serve immediately with maitre d'hotel butter and the crisped potatoes.

Kebabs with Pilaff

½ lb. of lean mutton
½ lb. of rump steak
3 lambs' kidneys
3 rashers of bacon
Pineapple chunks

Marinade

4 tablespoons of salad oil
3 tablespoons of vinegar
1 bay leaf
Salt
Black pepper
1 crushed clove of garlic

Trim the mutton and steak of all fat and gristle and cut them into cubes. Mix the marinade ingredients and pour them over the meat cubes. Steep the meat for two hours or longer. Skin the kidneys, cut in halves, and remove the cores. Remove the rind from the bacon, cut each rasher into two, and shape into rolls. Place the pieces of meat on skewers alternating with the other ingredients, and grill until the meat is tender, turning frequently. Service on a bed of pilaff or plain boiled rice.

Pilaff

2 oz. of butter
6 oz. of rice
Salt and pepper
1 skinned tomato
¾ pint of stock or water

Heat the butter, add the rice, and cook until it is slightly browned. Add seasonings, tomato, and stock or water and simmer until liquid is absorbed.

Grilled Kidneys with Bacon and Tomato

6 sheep kidneys
Bacon slices
3 tomatoes
6 slices of toast
¼ cup of oil
½ cup of vinegar

Skin the kidneys, split in halves, and remove the cores. Place in a marinade made from a mixture of the oil and vinegar and leave for an hour or more. Drain. Wrap each piece of kidney in a slice of bacon and fasten with a toothpick. Grill for five to eight minutes, turning frequently. Serve on toast and garnish with fried tomato slices.

Chicken Livers En Brochette

Cut chicken livers into small squares. Cut bacon into squares the size of the pieces of liver. Place alternate squares of bacon and liver on skewers, beginning and ending with the bacon. Preheat the griller. Cook at a moderate temperature for about 15 minutes, turning several times during cooking.

Bacon Open Faced Sandwich

6 slices of bread
6 rashers of bacon
12 slices of cheese
12 slices of tomato

Toast one side of the bread. Butter the untoasted side. Place two slices of the tomato on each slice of bread, cover with two slices of the cheese and two half rashers of the bacon. Toast under the griller until the bacon is cooked and the cheese melted.

Bacon Appetisers

Wrap stuffed olives, cooked pitted prunes, or oysters in thin slices of bacon. Secure with toothpicks. Grill at a moderate temperature until the bacon is cooked. Serve immediately.

Barbecue Sauce

(Suitable for basting grilled chicken)

2 tablespoons of oil
2 tablespoons of vinegar
1 teaspoon of mixed mustard
1 tablespoon of worcester sauce
3 tablespoons of tomato sauce

Combine all the ingredients and mix thoroughly.

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Queensland Pocket Year Book, 1959

The 1959 issue of the Queensland Pocket Year Book will be of value to all persons interested in the political, business, and social life of the State. The new issue follows the pattern of the nine previous issues as a small reference book of Queensland statistics. It provides the latest available statistical information on all the matters included in the earlier issues, including in most cases the financial year 1957-58 or the calendar year 1958. Copies may be obtained from the Deputy Commonwealth Statistician, 42 George Street, Brisbane, at a cost of 6d. each, or 10d. when posted.

The job of guiding a club

By J. PARK, State Organiser,
Junior Farmers' Organisation.

Everyone associated with a junior farmers' club should know why the club advisory committee exists. Unfortunately this is frequently not so, and as a result the advisory committee does too little, being ignorant or afraid of interfering, or does too much, thereby usurping the authority that belongs to the club, and preventing members from becoming confident and sure of themselves. Obviously both extremes are wrong, because, Youth benefits by consulting those who are experienced, and at the same time learns by doing.

Club members learn by making their own decisions and observing the results. Club and advisory committee members share the responsibility for maintaining harmony in their relationships. Co-operation is a two-way affair, and the club members cannot reasonably expect help from their advisers if they keep them in ignorance of what is going on. Unless the advisory committee is treated by the club as an important part of the organisation its members will lose interest.

All advisers may rightly expect to receive notices of meetings, and details of programme arrangements; similarly they should be kept informed of the content of the reports of various sub-committees. In all their dealings with them, the club members should treat the members of the advisory committee with courtesy and respect. To feel grateful to them is not enough. Gratitude should, from time to time, be expressed. As "it is the thought that counts," a timely vote of thanks or a personal letter of appreciation will be greatly appreciated.

Finally, advisers should be invited, and not asked to pay, to attend club functions.

Suggestions to Advisers

It has already been stated that one function of the advisory committee is to advise. Talking is not the only way of giving advice.

The old adage that "example is better than precept" applies most assuredly to advisers. It is strongly recommended that advisory committee members might themselves plan and conduct one meeting each year. This meeting might preferably be conducted early in the life of the newly-elected club executive and might be either serious or humorous in nature. In their handling of this meeting the advisers can by example show the club members how, or how not, to do the job.

Similarly, advisers might well conduct a model discussion group, or give short talks which will serve as examples for the club members.

The annual general meeting of the club should be attended by all advisers; other meetings need not be attended "in force." It is usually sufficient for two members of the committee to attend each meeting with advisers taking turns to be present. It is not desirable for the older people "to swamp" a club meeting.

When adults attend a meeting presided over by a chairman much younger than themselves, they must at all costs avoid placing the leader and themselves in an embarrassing position. Do not confront the young chairman with the difficult task of having to politely yet firmly tell a much older person that she or he is speaking out of turn or trying to exert too much authority.

Whilst it is everybody's duty to make the club, its purpose and its doings, known in the community, to recruit new members and to influence public opinion in its favour, this is particularly the task of the advisory committee members. Advisers will know many people whose goodwill is important and whose views carry weight. They should seek to gain this goodwill and by their attitude towards the club make known to all the good influence which a strong and effective club can have in the district. However loyalty to the club and the cause should not extend to stimulating unhealthy rivalaries between clubs or between the junior farmers and some other organisation.

Help with New Members

The advisory committee must be ready to discuss the club programme with the members, and if invited to do so, to select one of their number to "sit in" on meetings of the club's programme planning committee. When for some reason or another the club programme breaks down, members of the advisory committee should be available and ready to help either with suggestions or with personal assistance.

In assisting with the training of new members the advisory committee can be particularly helpful, and it is suggested that it is to these members rather than to the experienced ones that they can give the greatest assistance.

Advisers can be of particular help to clubs in suggesting, and helping with the planning of, club projects. Whether the project be a field day, the establishment of an experimental plot or some scheme to raise club funds or to help the community generally, it will be the better for discreetly given adult guidance, particularly during the planning stages. Such service in this instance as in most others, is best rendered indirectly or at the planning sub-committee meetings.

Where the club's finances are concerned the advisory committee should be ever alert to ensure that correct book keeping methods are employed, and that the club's funds are being spent in such a way that the objectives of the organisation might be achieved.

Finally, it might be stated that the function of the club advisory committee is to serve youth. The way in which the service is rendered is an important as the service itself. Service which smacks of patronage or which is given with some ulterior motive is as repugnant and as damaging as that which restricts the full development of the personalities of members. Let us hope that the service which is given by the advisers will be helpful, and that it will ensure that the club becomes and remains a happy one.

Hints to Club Members

To guarantee the necessary annual intake of new members it is essential that the junior farmers' club establish a friendly liaison with the local State schools. Invite the upper grade pupils, and more particularly project club members, along to several club meetings each year. Arrange an interesting evening, and encourage the pupils to take part. As the year draws to a close, special efforts should be made to induce those pupils who are leaving school to join the club. Remember though that these new and young members will need special care and encouragement, so make provision for them in your club programme.

Summer Maize And Winter Pasture Under Irrigation

By C. A. SCHRODER, Regional Experiment Stations Branch

Subterranean clover has been developed as a useful irrigated pasture for the autumn and winter period in the Lockyer Valley. The use of the same land in summer for production of maize, also irrigated, is discussed in this article.

Benefits from the farming plan that combines this growing of summer maize and winter pasture under irrigation are listed briefly as follows:

(1) Both crops grow in their proper seasons. In this respect they combine well and give good use of the climatic conditions. There is an overlap period in February-May when the two crops are growing in conjunction.

(2) The combination suits the stock farmer who has irrigation. It provides very nutritious grazing at low cost over a period when natural feed is normally absent. It also provides a good crop of maize for silage or grain. The maize occupies the land at a time when it would otherwise be unproductive and it does not appreciably reduce the annual grazing return from the pasture.

(3) The pasture phase improves the soil structure and fertility to the benefit of the maize.

(4) Land preparation for the maize, and the weed control practised during its early growth, remove the competition of summer volunteer species and provide a good bed for clover regeneration. The maize gives beneficial shade to the clover seedlings.

(5) There is economy of irrigation water. Permanent irrigated pastures based on white clover require approximately 30-36 in. of irrigation a year in the Lockyer Valley for maximum production. Indications are that approximately 15 to 16 in. of irrigation should be sufficient in most years for the full needs of one acre of Yarloop subterranean clover plus maize. The annual yield per acre from maize for silage plus Yarloop is of approximately the same order as that from well managed permanent irrigated pasture.

Irrigation of winter pasture affords good use in Queensland of "harvested" water (this is normally harvested in January-March) before the heat of summer when water losses and water usage are high.

The Lockyer Valley

The Lockyer Valley of South Eastern Queensland is today well known as one of the most fertile agricultural areas in Australia. However because of climatic vagaries success in farming is very largely dependent on the use of supplementary irrigation. **Average production under rainfall conditions is of a very low order.**

The annual rainfall is approximately 29 in. Just over 20 in. of this amount fall during the six-month period October-March.

The summer rains, however, are so erratic that failure of summer crops and shortage of good pasture during summer months are frequent occurrences. For example, maize crops grown on rainfall frequently return very poor yields due to moisture stress at some stage; although isolated yields occasionally exceed 100 bus. of grain per acre, the average return is around the low figure of 20 bus. In a similar way, because of frequent periods of moisture stress, rain-grown summer pastures are often low in quantity, quality or both; and animals dependent on them give satisfactory production only in short intermittent bursts.

A further disability is that, as a result of the rainfall being summer dominant, very little natural pasture growth occurs during April to October. Through this period, animal production either ceases or goes on at a very low level unless steps are taken to provide suitable feeding supplements.

The Soils and Irrigation

Lockyer Valley soils are highly fertile.

Good supplies of irrigation water are available, especially in autumn, winter and spring.

The application of irrigation to supplement rainfall enables farmers to maintain high yields from crops and pastures.

Plate 1

The 1957-58 Maize Crop Ready for Harvest on 14th May, 1958. Some maize has been pushed aside for the photo. Note the self-regenerated pasture present.

Subterranean Clover

Early strains of subterranean clover, particularly Yarloop, give good performance in the Lockyer Valley at the Gatton Regional Experiment Station when irrigation is provided to supplement rainfall.

Vigorous pasture stands occur every year from natural regeneration. Fast growth rates are recorded regularly (Yarloop makes considerably faster winter growth than does white clover) and pasture from this source normally provides five good grazings every season between early May and mid-October.

An area of Yarloop grazed one or two hours each day provides a very satisfactory source of protein in a period when it is urgently needed. Grazed in this manner, it does much to assist in maintaining a good level of production in the dairy herd during the vulnerable period of May to October.

The average seasonal irrigation requirement of such a pasture is approximately 12 in.

The Clover Area in Summer

After seeding in late October-early November, the subclover dies off and provides no further grazing until the stand re-establishes and reaches grazing condition in the following May.

Feed provided during summer in the area down to sub. is chiefly confined to the growth of volunteer species such as crowsfoot and woolly-topped Rhodes grasses, wild millet and other summer growing weeds. **The amount of feed produced is small and the quality is low.** A small return can be obtained by including a very light seeding of lucerne with the clover.

Therefore the summer period, which is actually the season of

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N 28-32 IRRIGATED ANNUAL
WINTER PASTURE
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Plate 2

A Close-Up View of the Pasture Shown in Plate 1.

Plate 3

The Same Pasture Being Grazed for the Second Time in the Season.
Taken 20-6-58.

natural growth in the Lockyer, is largely wasted in an area set aside for subterranean clover alone.

The rainfall, long days and warmth of summer add practically nothing to the farmer's income.

Experimental Results So Far

At the Gatton Regional Experiment Station an attempt is being made to obtain a good return from the land during summer, and in doing this to utilize the benefits of the rain and the warm conditions with the backing of irrigation in times of moisture stress.

An experiment is in progress to examine the possibility of producing a crop of summer maize in the subterranean clover area without appreciably reducing the normal seasonal winter grazing return from the clover.

The overall annual irrigation requirement is being kept in mind.

The trial was commenced in 1957 and encouraging results are being obtained. These are outlined briefly:

First Year (1957-58)—Maize

Following the seeding down and drying off of a Yarloop subterranean pasture (originally planted 3-7-56) in November 1957, half of the area was chisel ploughed and tine cultivated. A crop of hybrid maize for grain production was drilled in on 6-1-58. To allow better light conditions for the anticipated clover seedlings, the rather wide row spacing of 6 ft. was used for the maize. Plant spacings within the rows were reduced to give near normal population.

In the absence of rainfall, which had delayed the planting of the maize from December, a spray irrigation of 2 in. was applied for germination. Subsequent rainfall was satisfactory and no further irrigation was required during the life of the crop.

Maize Yield.—The maize was harvested for grain on 14-5-58 and yielded 53 bus. per acre. Though not high, this was approximately double the Queensland average.

First Year—Clover

Regeneration and subsequent re-establishment of the clover among the growing maize crop exceeded expectations.

Cultivation for weed control in the maize provided a good clean seed bed for the clover. Very good germination occurred during February. The growing maize provided the clover seedlings with beneficial shading from the summer sun, while the wide rows afforded sufficient light for them to develop rapidly into sturdy, fast-growing plants. As the days became shorter and the light intensity decreased during autumn, the clover benefited by the maturing and the thinning of the maize cover.

At the date the maize was harvested for grain, there was a dense sward of clover ready for grazing.

Stock were introduced for the first seasonal grazing of the clover immediately the maize was harvested.

The stand of clover growing among the maize was practically equal in every way to that in the half of the area which had been given normal summer treatment and not planted to maize. This near-equality lasted throughout the season during which five good grazings were obtained by the end of October.

Clover Yields.—The total yields of green pasture for the season were 22·94 tons to the acre in the area planted to maize and 23·51 tons to the acre in the area not planted to maize. Both yields were a little lower than average. This was largely the result of a very heavy overgrazing by sheep at the second

Plate 4

Six-foot Rows of Maize planted 22-12-58 After Ploughing the Area Shown in Plates 1, 2, and 3. This photo was taken 23-2-59.

Plate 5

Photo taken at time of Harvesting for Silage on 16-3-59.

period of grazing during 20–24-6-58 when every clover leaf was eaten off.

TABLE 1

IRRIGATION

Irrigation comprised :—

Maize		Pasture	
6–1–58	2·0 in.	21–5–58	2·7 in.
		11–7–58	2·3 in.
		28–7–58	1·8 in.
		1–9–58	2·5 in.
		17–10–58	2·5 in.
		29–10–58	3·4 in.
Totals	2·0 in.		15·2 in.

Combined total for both crops 17·2 in.

The clover required above average irrigation. The total of 15·2 in. was applied in six waterings. Record maximum temperatures for October were recorded in 1958 when a screen reading of 104·2 deg. F. was registered. Of the total irrigation applied, 5·9 in. were put on right at the end of the season during the last two weeks of October to ensure seed setting and ripening during the abnormal heat wave conditions.

Second Year (1958-59)

The trial was continued in the same area in 1958-59. Results for the season are available to the time the maize grain crop was harvested and yields determined.

In November 1958, the whole of the subterranean area discussed earlier was plowed 3-4 in. deep. Following discing and tining, hybrid maize was drilled in on 22-12-59. On this occasion two row widths were used, namely 4 ft. and 6 ft. The same plant spacing was used in each row width, the actual plant stands comprising approximately 15,000 and 10,000 plants to the acre respectively.

With irrigation available to prevent shortage of moisture from becoming a limiting factor in the maize growth, it was decided to apply fertilizer with a view to increasing the maize yields. Fertilizer applications comprised—

16-1-59—Approximately 3½ cwt./acre of a mixture made up of 3 parts of a complete fertilizer mixture (10:8·25:7·5) to 1 part of sulphate of ammonia was introduced into the soil with the sodseeder.

4-2-59—2 cwt/acre sulphate of ammonia as a top dressing.

Maize Growth.—As a result of good early rains and fertilizer application, the maize made very fast early growth throughout January.

With irrigation applied as required, the maize maintained spectacular growth throughout the whole area, showing uniform, very dark green, tall stalks of large diameter and much superior to the previous year's crop.

The vigour is indicated by Plates 4 and 5 and by the yield figures given later.

Maize Yields.—Silage: On 16-3-59 half of the maize in each row width was harvested for silage with a maize binder. The actual green yields were—

	Tons per acre
From 4-ft. rows . .	21·7
From 6-ft. rows . .	15·3

When harvested for silage, the average measurements and weight per stalk in each row width were almost identical. The yields were proportionate to the number of plants per acre.

Grain.—The half of the crop not utilized for silage was allowed to mature for grain. Harvesting of this area was carried out on 3-6-59. After being harvested, the cobs were sun and air dried, the cobs were shelled and the grain weighed on 16-6-59 when the following grain yields were recorded:—

	Bush. per acre
4-ft. rows	151·5
6-ft. rows	117·1

There were practically no barren stalks. All cobs borne one per stalk were very large while quite a number of stalks carried two good cobs. The 6-ft. rows produced particularly large cobs and the grain yield per stalk was greater than in the 4-ft. rows.

The yield figures were particularly good, especially when there were some almost worthless crops (not irrigated) produced in the district on similar soils.

Clover.—The clover germinated among the growing maize in February.

Regeneration, development, and the early grazing return from the clover showed a good deal of variation in the different maize row widths and crop treatments.

With the maize stalks taller and leafier than in the previous season, more light was intercepted. The light interception was not great enough in the 6-ft. rows to seriously impede the clover development.

On the other hand, the shading in the 4-ft. rows was so heavy that the clover seedlings soon became spindly and made only slow growth. However, all plants remained alive.

In the maize area allotted for silage, the clover made an immediate response when the maize was removed on 16-3-59. While this response was quite marked in the 6-ft. row portion, it was outstanding in the 4-ft. portion. In the latter, the existing spindly, unthrifty

Plate 6

Close-Up View of Clover. Note the maize stubble from the silage harvest and the density of the Yarloop cover.

plants developed spectacularly; they quickly became sturdy and vigorous and by mid April had developed into a very satisfactory pasture. (See plate 6.)

In the maize area allotted for grain production the clover in the 6-ft. rows maintained quite good growth. In the 4-ft. maize rows, the poor spindly clover plants present when the maize was at silage stage remained alive but made practically no growth. As the maize crop matured, the thinning stand allowed an increasing amount of light to penetrate and the clover in both maize row widths responded.

The early condition of the pasture and the effect of the various maize treatments are indicated by the pasture yield determinations made when the stock were introduced for the first time of grazing on 1-5-59.

These yields were—

Maize Silage Area—

6-ft. rows, 4.72 tons per acre (green weight).

4-ft. rows, 3·18 tons per acre (green weight).

Maize Grain Area—

6-ft. rows, 2·86 tons per acre (green weight).

4-ft. rows, ·60 tons per acre (green weight).

These are discussed very briefly as follows:—

(*a*) Regeneration and early development of the clover were good in both row widths throughout the maize silage area. At this date the yield in the 6-ft. maize rows was slightly better than in the 4-ft. rows.

(*b*) Regeneration and early development of the clover in the maize grain area were not as good as in the silage area. The stand in the 6-ft. rows must nevertheless be classed as very good and capable of giving a very good season's performance. In the 4-ft. rows, the clover yield was negligible; no early grazing was provided; however, the clover population and the condition of the individual plants were such that good grazing should be provided from approximately late July onwards.

A visual examination of the area at this time indicated—

(1) That the growth rate of the clover in both row widths in the maize silage area and in the 6-ft. row widths in the maize grain area could be expected to level out and that the total grazing for the season would show little if any reduction due to the crop of maize.

(2) That the total grazing for the season would be considerably reduced by the crop of maize for grain in the row width of 4 ft.

Pasture Regrowth after First Grazing

At the time of maize harvest on 3-6-59, the clover was almost ready for the second grazing. The condition of the pasture at this date verified the foregoing observations.

TABLE 2

IRRIGATION

Maize		Maize plus Regenerated Pasture	
9–2–59	2·0 in.	4–3–59	2·0 in.
		18–3–59	2·0 in.
		10–4–59	2·0 in.
		5–5–59	1·7 in.

The combined use of irrigation total for both crops to the time of maize harvest on 3–6–59 was 9·7 in.

The rainfall for February was largely confined to 5·89 in. of storm rain during the sixteenth to the eighteenth of the month (4·88 in. on 18-2-59). March, April, May, and June registrations were well below normal every

Plate 7

Close-Up View of Yarloop Within 6-ft. Rows of Maize.

month (average 46 per cent. below). Under these conditions, four irrigations were applied between 3rd March and 5th April so that the maize could utilize the available nutrients and warm conditions.

Summing Up

In each of the first two seasons of the trial, successful maize crops were produced. With the application of fertilizer in the second year, very heavy yields of silage and grain were obtained in both row widths used.

The maize crops did not retard the date of the first grazing of the pasture nor seriously reduce total pasture production in any treatment other than where maize was grown for grain production in 4-ft. rows.

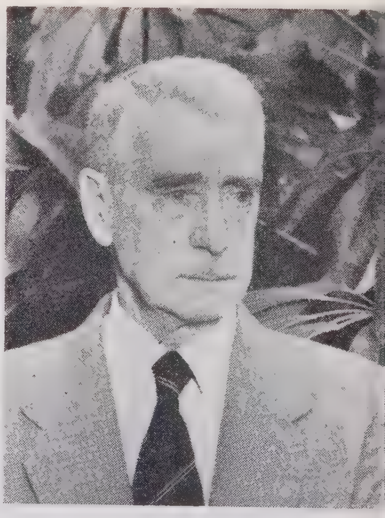
Irrigation requirements were low and economy of irrigation was effected. In 1958, the October maximum temperatures reached an all-time record yet the total irrigation applied for both crops in the year was only 17·2 in. Below normal rainfall was recorded in 1959 from mid-February to July. The total irrigation applied up to the time of harvest of the maize crop on 3-6-59 was only 9·7 in.

It is emphasized that availability of irrigation is essential. Good crops of maize are seldom obtained without irrigation being applied at some stage. Production of the types of pasture dealt with is dependent on supplementary irrigation. Their growth should not be attempted without it—any such attempt can be expected to result in failure.

* * *

Colonel Murray's Tribute

A tribute to the work of the technologists was paid by Colonel J. K. Murray in his centenary address to the Queensland branch of the Australian Institute of Agricultural Science in Brisbane. Referring to the Queensland Department of Agriculture and Stock, Colonel Murray said:



"The work of the Department of Agriculture and Stock has extended over the whole of Queensland and its hundreds of research and extension officers have contributed continuously and efficiently to the development of the agricultural industries. It would be impossible to assess the technological contributions, in all their diversity, made to rural production and its promise for the future, except to say that the present prosperity of the State would never have been reached without the Department's contributions in all the applied sciences related to agriculture and stock. Some slight measure of its achievement may lie in its introduction of some 70-odd crop plants and its programme of soil investigations, plant breeding, disease and pest control, and the orderly marketing of many of them."

Pasture and Crop

Hints on Growing Soybeans.—The soybean plant is an upright branching summer legume which has been used to provide green feed, green manure and hay, but its principal value is in the seed. It does best on friable loam soils, although satisfactory yields can be obtained from a wide range of soil types, varying from clay loams to sandy loams. Heavy clays and soils of low fertility should be avoided. Its climatic range is similar to that of maize, but particular attention needs to be paid to varieties suitable for different districts.

In the South Burnett, many varieties have been tried. Those proving most suitable for seed production are Nanda and Yelnando, and for green feed, or green manure, Gatan, Otootan, and Avoyelles. Nanda produces straw-coloured seed attractive to the trade, produces it sufficiently far above the ground to make harvesting easy, and normally shatters little. Occasionally, though, shattering may be severe. It grows to about 26 in. in height and matures in 160 days. Yelnando also produces an attractive seed high on the plant, shatters very little, averages 30 in. in height and matures in 165 days.

Shattering is a characteristic of all soybeans, and particular attention should be paid to time of harvest if losses are to be avoided.

Gatan and Otootan have a vining habit, grow up to 40 in. in diameter, reach a height of 18 in. and mature in 170 days. Avoyelles is semi-erect, free branching and matures in about 166 days. For silage, these varieties can be grown with Sudan grass or maize. Their seed is dark-coloured and not a product attractive to the human consumer, but it could be used for stock food.

So far as is known, no attempt has been made to make hay from soybeans in the South Burnett, and there has been limited experience with grazing. Interstate sources say that "soybeans do not come again after grazing," but possibly time of grazing and variety would have an effect on this. Yields up to 3 tons of hay and 12 tons of green stuff to the acre could be expected. They should be cut for hay when the pods are half formed.

In the South Burnett district, soybeans are sown for seed production at not less than 25 lb. to the acre in 36 in. rows. Narrower row spacing, down to 21 in., may be used if inter-row machinery is suitable. For green crops, up to 90 lb. of seed to the acre may be used for dense stands. The amount of seed required for 24 in. row spacing would be 40 lb., but varying with seed size.

Soybeans should not be planted too deep, not more than 2 in. on most soils and not more than 3 in. on sandy soils. A maize planter or combine is suitable for the job. More than one inter-row cultivation is seldom needed, and only limited hilling, to facilitate harvesting, is desirable.

The leaves fall off the plant as it matures, leaving the pods attached to the skeleton. Harvesting should commence before shattering occurs, using a header with reduced drum speed and open or other variations to the concave.

Yields vary with the season, but in the South Burnett have been up to 15 three bushel bags to the acre. The average would be about 6 bags.

New varieties and progenies developed in Queensland are at present under investigation, and may soon replace some of the varieties now recommended.

Any farmer thinking of growing soybeans should ensure a market before planting extensive areas.

—*D. R. EVANS,*
Agriculture Branch.

Sweet Potatoes for Cash or Stock. Sweet Potatoes offer farmers either a ready cash return or good food for pigs and cows. The crop does well in most farming districts in Queensland. As more farmers recognise its merits, there's every reason to expect bigger plantings in the future.

Officers of Agriculture Branch advise that average yields from sweet potatoes are about six to eight tons an acre. Heavy crops running as high as 15 tons an acre are obtained occasionally under ideal conditions.

The most suitable soils for sweet potatoes are sandy loams and sandy clay loams. Even poor sandy soils will produce good crops if suitable fertilizer is applied. Red volcanic soils like those on the Atherton Tableland produce good crops. But avoid the heavy clay soils as these are completely unsuitable. So, too, are the rich alluvials, because these produce heavy vine growth but few tubers.

Excessive vine growth with few tubers occurs also when a fertilizer too rich in nitrogen is used. For most soils, use a 4: 12: 4 or similar fertilizer mixture at 4 to 5 cwt. an acre. On the poorer, sandy soils, however, it's better to use a 6: 14: 10 mixture at 5 to 6 cwt. an acre.

Varieties recommended by Agriculture Branch are Abundance for the table trade and White Maltese for pig and cow food.

Sweet potatoes should be planted as soon as the danger of frost has passed. Varieties differ in the time they take to grow, but usually the mature tubers can be harvested four to five months after planting. If late-maturing varieties are planted too late in the season, no tubers will develop until the following season.

Sweet potatoes are an easy crop to feed to stock. Harvesting of crops grown for pig food can be safely left to the pigs themselves. If sweet potatoes are grown for cow food, the tubers have to be ploughed out so that the animals can get at them. The cows will then pick up the tubers from the ploughed ground.

Check on Quality. The Standards Branch of the Agriculture Department controls the quality of many of the agricultural products used by the man on the land.

In particular, these items include stock foods, fertilizers, pest destroyers, and veterinary medicines. All of these items must be registered with the Standards Branch before being placed on the market in Queensland.

The reason for this requirement is to enable the Department to ascertain the quality and usefulness of the agricultural requirement by knowing the formula of each product, thus ensuring that inferior products are not offered for sale.

When registered, these agricultural requirements must be correctly labelled, showing, among other things, active constituents or chemical analysis and in the case of pest destroyers and veterinary medicines full directions for use.

When buying these products you would be wise to purchase recognised brands and particularly to avoid unlabelled or unbranded agricultural requirements.

—*B. LINNETT,*
Inspector, Standards Branch.

Centro-Molasses Pasture Finds Place In Cooroy District

By N. DOUGLAS,
Agriculture Branch Officer.

While the value of centro-molasses grass pastures is well recognised in north Queensland, little information is available to date regarding their potential in the south-eastern portion of the State. In the Cooroy district, however, this pasture has lately found a place in frost-free locations which are not dominated by sward grasses.

Centro is a perennial, twining legume which shows a marked tendency to climb. Once established, it does provide a dense ground cover. It has a high protein value, ranging from 15 to 23 per cent., according to stage of growth. A summer-growing plant, native to the tropics, it will stand occasional frosts if it has adequate plant cover. Centro

Plate 1

A Four-Year-Old Centro and Molasses Grass Pasture on the Property of Cooney Bros., Nambour, June 21, 1958. The area had been closed to allow bulk growth to be made and seeding to take place.

Plate 2

The Climbing Characteristic of Centro. If it has not the opportunity to climb, it will form a solid mat of vine over the ground surface. Note the seed pods.

particularly favours a northerly aspect in this district.

Molasses grass is a pioneer grass which will overgrow vigorous scrub weeds and yield good grazing if managed correctly.

While paspalum and kikuyu still remain the best dairying grasses we have at our disposal, there are areas where they can be established only with great difficulty. These areas are often dominated by blady grass, bracken fern and kangaroo grass. There are also old banana plantations or bean patches which require re-grassing. It is in such places that centro and molasses grass have demonstrated their ability to compete with and finally dominate the inevitable phase of coarse grass and weeds.

Local History

The first stand of centro and molasses grass was established during 1954 in an old banana patch in the nearby Nambour district. This land was so steep that it could not be cultivated even though the owners, Messrs. Cooney Bros., possessed a small crawler tractor. The seed mixture was planted by hand, a few seeds being placed in holes dug by a chipping hoe. After a slow start the first year, this pasture is now flourishing—as can be seen in accompanying photos. Following this small start, a considerable acreage has been planted throughout the district.

From a 5-acre area of centro and molasses grass established in the Mooloolah district, some 2,638 cow/hours were obtained during the first grazing. As this area becomes older, better grazing yields are expected. Before the establishment of the centro and molasses grass, the paddock was dominated by blady grass and neglected by the stock.

Another grazing trial, after a very poor start in the 1957 drought, has recorded 1,719 cow/hours of grazing from a 5-acre areas. The adjacent control paddock of 5 acres yielded 952 cow/hours of grazing.

Further Uses

Another role for molasses grass and centro is in the re-grassing of groundsel patches. A heavy stand of groundsel kills out all pasture growth. One method of tackling this problem is to brush the groundsel during the winter months, then burn in the following summer. After the burn, centro and molasses grass are planted in the ash. The re-growth groundsel is then sprayed as it comes away.

Planting

It is recommended that whereever possible, some sort of seedbed preparation should be carried out. A good stand may be expected after a scrub burn, but if the seed is thrown in the ash after a grass fire the result is generally disappointing.

The recommended planting mixture in the Cooroy district is 4 lb. of molasses grass and 6 lb. of centro seed to the acre. As centro is a legume, the seed should be treated with the correct inoculum prior to planting. Inoculum may be procured free of cost from the Department of Agriculture and Stock at Brisbane, Cooroy or Gympie.

Plate 3

A well-managed Centro and Molasses Grass Pasture, January 27, 1959. Before the establishment of this pasture, this land was dominated by blady grass and bracken fern.

Plate 4

Molasses Grass Can be Used to Regrass Areas that were Dominated by Heavy Groundsel. The groundsel that comes away after the fire is sprayed with hormone.

Molasses grass seed is very small and tends to clump together, so the following planting procedure is suggested: After inoculating the centro seed, mix it and the molasses grass seed together with sawdust and then broadcast the resultant mixture. Usually one bag of sawdust will provide sufficient bulk for 2 acres.

If the area to be planted is carrying a heavy blady grass and/or bracken fern cover, it would be advantageous to crop the area with oats before planting the pasture mixture. The cropping period and the extra working will control the blady grass and bracken fern to a large extent. This is not possible on steep slopes. Planting may be carried out from September to February but most successful plantings are made in the December-January period depending on the season.

Management

If the area planted cannot be closed to stock at suitable times, there is little point in planting the mixture. Uncontrolled grazing will soon deplete the stand. Molasses grass has its crown above the soil surface, and if overgrazed, the crown will be damaged and the grass will die.

Centro is slow in establishing, so grazing should be restricted to the minimum during the year of establishment. All subsequent stocking should be for short periods of heavy grazing, allowing adequate time between grazings for the plants to recover. The pasture should never be grazed closer than 6 to 8 in.

The following is the suggested overall management of the pastures: Close the area from stock in late February and so allow it to make bulky growth before seeding in May and June. This growth can be successfully grazed off in early spring after seed has matured. Good quality bulk feed is scarce at this period of the year so this deferred grazing will help to carry stock through the normally dry spring. The pastures may then be grazed intermittently until February when the cycle is repeated.

The reasons for this suggested cycle are twofold. First, it allows the centro and molasses grass to seed. This seed may be collected for further planting. Second, it gives the pasture a chance to dominate other weeds and grasses in the area.

Another important point to remember is that fire may kill out molasses grass, so do not burn the pasture.

Fertilizer

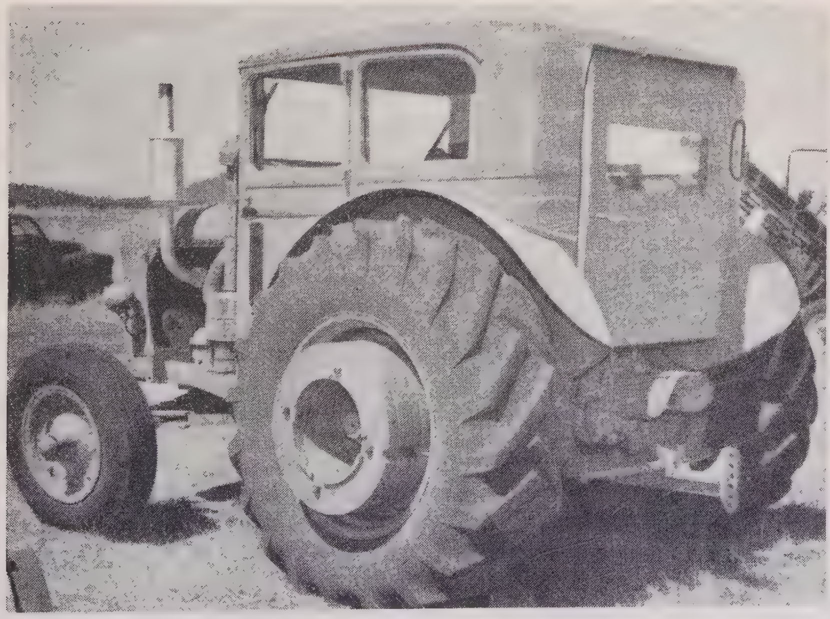
It is recommended that after the first good spring rains, the pasture be top-dressed with one bag of nitrogen-phosphate fertilizer to the acre. Make this an annual application. This fertilizer stimulates the pasture to more vigorous competitive growth and yield.

A summary of more important points to remember—

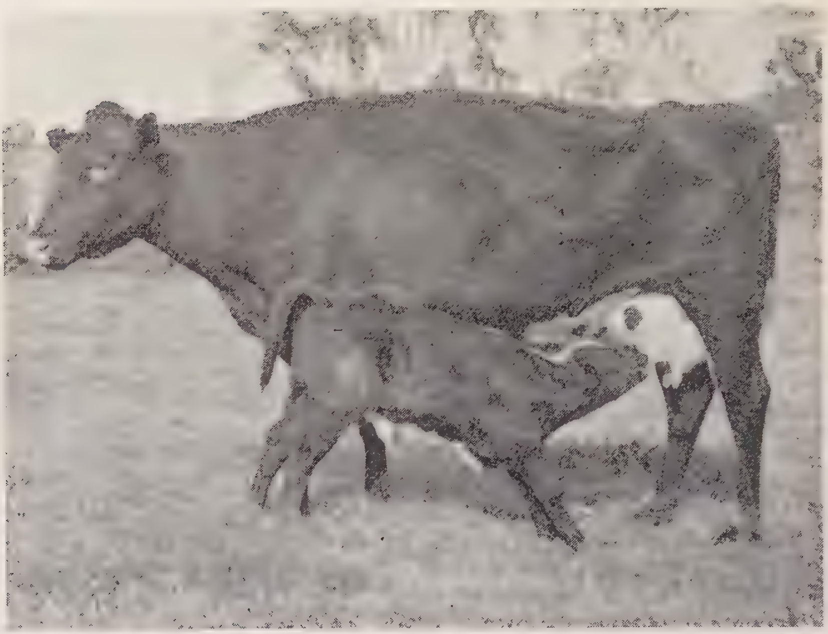
1. Plant in frost-free locations which are not dominated by a sward grass.
2. Controlled grazing is essential to the life of the pastures.
3. Allow pasture to make bulk growth and seed annually.
4. Graze lightly in first year.
5. Do not burn.

◆

Toowoomba Farmers' Festival



This Cabin For a Farm Tractor Made from a 1930 Dodge Sedan Was Entered in the Toowoomba Farmers' Festival by Mr. M. Walsh, of Clifton.



Calves Must Have Colostrum

ONE of the corner-stones in building a dairy herd is rearing healthy calves. Healthy calves cost money to rear, but sick calves cost a lot more.

A calf is born with very small reserves of vitamin A and little resistance to the diseases that so often surround yards, sheds and paddocks. It is vital, therefore, to give the calf assistance in combating these diseases.

The calf must receive colostrum, either by sucking its mother or by bucket feeding.

Colostrum, a cow's first milk after calving, is particularly rich in vitamin A and antibodies which the newborn calf readily absorbs. These afford some protection. The vitamin A is contained in the highly coloured fat, and the antibodies in the globulin portion of the protein. Vitamin A and antibodies in a cow's milk return to normal a few days after calving.

Sometimes the mother dies before the calf has had its colostrum. Then the addition of an antibiotic to normal milk will act as a substitute. It will prevent or reduce the severity of that bacterial infection which sometimes occurs soon after birth, and which often occurs during the first two months of a calf's life.

—A. HUTCHINGS,
Senior Adviser in Cattle Husbandry.

Plate 1: Controlled Grazing Has Many Advantages When There Is An Abundance of Succulent Feed.

Reducing the Risk of Bloat

By T. H. RUDDER, Cattle Husbandry Branch

A sure way of preventing bloat is not known at present, but a tallow spray on the pasture is the most effective and promising method so far devised.

Bloat is a common occurrence in herds where irrigated lucerne or clover-dominant pastures are fed. As irrigated pastures offer one of the best methods of raising the level of nutrition during the autumn to spring months, bloat is a serious problem.

The economic losses due to bloat are possibly higher than generally recognised. At present, it is impossible to estimate in terms of money the actual loss of farm income. However, when the following four factors are considered, it will be seen that this loss is considerable:

1. *Losses due to Death.* Untreated cases of bloat often lead to the death of animals.

2. *Reduced Milk Production.* It is generally accepted that good quality pasture is the most econ-

omical feed for dairy cows. For high production from pastures, the cow must have as much good quality pasture as she can eat.

In an endeavour to avoid fatal cases of bloat, it is a common practice to restrict grazing time on the irrigated pasture. As the rain-grown pastures are of poor quality during most of the April-October period, this practice limits the intake of good quality feed and thus limits production.

Where cases of bloat occur, the cow has to be removed for treatment. Thus grazing is further limited. In addition, the discomfort by the bloated animal has an adverse effect on production. Further, there is the likelihood of lower production due to recurring mild cases of bloat.

When considering the money invested in an irrigation plant and in establishing pastures, this aspect is very important. Being unable to graze the irrigated pasture to best advantage probably causes greater economic loss than do deaths.

3. *Labour Costs.* Considerable time has to be spent in supervising the grazing herd to observe cases of bloat, in addition to the time spent in treating actual cases.

4. *Cost of Drugs for Treating Bloated Cows.*—Depending on the method of treatment, drugs can easily cost up to 5s. for each case.

Due to the variation in the incidence and severity of bloat between cows within a herd from day to day, this disease is very difficult to control.

The April-May to September-November period is the most dangerous for bloating. During this period it is wise to be prepared for cases of bloat every day. Of course, there will be days when bloat will not occur but such days cannot be forecast.

The Danger Can Be Reduced

A sure way of totally preventing bloat is not known at present, but the use of a tallow spray on the pasture is the most effective and promising method so far devised.

The following techniques will greatly reduce the incidence and severity of bloat; the means adopted will be largely determined by the facilities available on the particular farm:

1. *Pasture Management.* Pasture management should aim at keeping the legume content of the pasture below 50 per cent. of the total bulk. Bloat incidence and severity is reduced if such a mixture can be maintained.

Due to climatic conditions, this is not always possible. However, good pasture management can shorten the "bloat-season".

2. *Feeding Hay or Silage.* Hungry animals bloat more readily than those fed hay or silage before grazing "bloaty" pasture. Access to a rack containing some coarse-stemmed hay is useful. The rack should be reasonably close to the grazing area.

3. *Using an Electric Fence for Strip Grazing.* By rationing the area available, the stock are forced to eat the more fibrous stalks as well as the succulent tips of the pasture legume. Also, cows are less likely to bloat if allowed a given area instead of a given time. This is because they eat quickly when on a short time limit. Any change in management should be made gradually if the stock have been accustomed to a time limit.

4. *Cutting and Wilting of the Pasture* for half a day prior to grazing have given good results in the control of bloat.

5. *Pasture Spraying.* Preliminary experiments have shown that spraying the pasture with 2 to 3 oz. of tallow for each cow a day will reduce the incidence and severity of bloat.

The cost of this preventive is 5s. to 7s. a cow a month. This is regarded as the most effective method of control to date.

Insufficient work has been done on this method in Queensland to indicate the best technique. However, the following materials and methods have given satisfactory results but should not be regarded necessarily as the final recommendation on the subject:

Recipe for 60 cows—

7-10 lb. tallow—free from hairs, hide, etc.

½ lb. detergent (Lissapol NX has been used).

4 gallons hot water at 180 deg. to 200 deg. F.

Add sufficient water to spray the required area.

Method. Place the tallow and detergent in a container and then mix with the hot water. Add this mixture to enough water to give the necessary cover over the area.

A small pump fitted to a tractor is suitable for spraying the material on the pasture. Using a boom spray pressure of 20–25 lb. to the sq. in. about 8 gall. of fluid to the acre is required. A hand-operated knapsack spray is effective on a small scale.

After the mixture is made up to the quantity required, agitation is needed. This is easily achieved by pumping the mixture through the pump and back into the container.

Time and labour are saved if a two days' grazing area is sprayed at one time. Unless heavy rain falls, the tallow will remain effective on the grass for at least two days. In any case, spraying should be done at least half a day before grazing.

Reports from other States indicate that a stock emulsion which may be stored for two weeks can be made if a stabilizing agent is used. The recipe to make sufficient for 60 to 80 cows is:

1½ oz. stabilizing agent (Cellofas B was used).

½ lb. detergent.

10 lb. melted tallow.

Method. Stir the stabilizing powder into half a gal. of hot water, then make up to one gal. with water.

Mix the detergent into the melted tallow, then slowly add mixture containing stabilizing powder.

Add 2 gal. of hot water and stir.

This makes the stock mixture.

One gal. of the stock emulsion is sufficient for 25 cows.

When using, stir the stock emulsion and add to the quantity of hot water required. If the requirement is for 50 cows over 1 acre, then 2 gal. of the stock would be added to about 6 gal. of hot water.

6. *Penicillin.* Preliminary trials based on overseas work indicate that penicillin may play a role in bloat control. A dose of 100,000 units of penicillin four to six hours before grazing of bloat-producing pasture promises to reduce the occurrence and severity of bloat for two or three days.

Where cows are fed an individual grain ration, this method could become an easy way of prevention. The cost involved would be about 5s. a cow monthly.

At this stage, this preventive should only be attempted under the guidance of a veterinary officer. The possibility of undesirable side-effects due to continued penicillin treatment has yet to be determined. There is also evidence that penicillin loses its effectiveness after treatment has continued for two to three weeks.

Tallow spraying combined with the management techniques offer the best protection at present under Queensland conditions. However, these methods should be approached with care and attention to detail.

It is stressed that these techniques are claimed to reduce the incidence and severity of bloat, not eliminate the danger. Observation for, and facilities to treat, cases of bloat should not be forgotten.

Advice on the treatment of bloat is contained in Advirsory Leaflet No. 53 entitled "Bloat in Dairy Cattle." This leaflet is available on request from the Department of Agriculture and Stock.

The Value Of Fodder Cane

Fodder cane is proving a profitable and practical way of conserving carbohydrate-rich fodder on many farms. It has been referred to as "The Poor Man's Silo." Good yields of up to 70 tons to the acre have been obtained on Queensland farms. The crop shown (variety Q50) on Mr. Roy Austin's farm at Logan Village was calculated to yield 50 tons to the acre. At this yield, the cost for land preparation, planting material and fertilizer was 10s. a ton.

Cream Cooler For Small Herd

By J. B. WILSON,
Dairy Officer

When cream is produced under clean conditions, cooling to 70 deg. F. and storing at that temperature provide conditions that help to ensure choice grade quality. These conditions have been fulfilled in an unusual type of cream cooler developed by a farmer in the Boonah district, and its

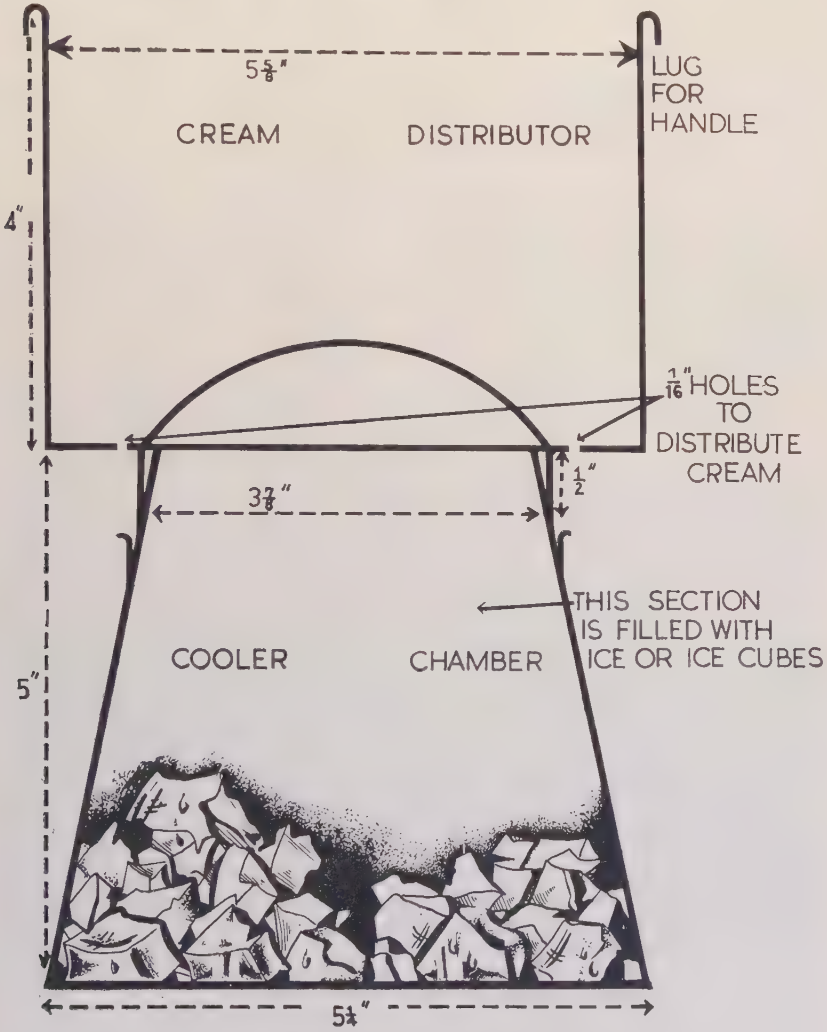

5⅝"
CREAM DISTRIBUTOR
LUG FOR HANDLE
4"
1/16" HOLES TO DISTRIBUTE CREAM
3⅞"
½"
THIS SECTION IS FILLED WITH ICE OR ICE CUBES
COOLER CHAMBER
5"
5¼"

Plate 1

Cross Section of Distributor and Cooler Assembled.

success suggests that this unit has a place on the small-herd farm. With this unit, cream has been cooled from about 85 deg. F. to 70 deg. F. as it falls from the separator into the can.

The cooler consists of two sections: a distributor tray containing a ring of small holes, and a cooling chamber into which a mixture of ice and water is placed. The holes in the distributor tray must be so spaced as to ensure an even flow of cream over the cooling chamber. The separate saucer-shaped fitting distributes cream evenly to the holes in the tray.

When in use, the top tray is fitted to the two projecting lugs of the cooling chamber (Plate 1).

Between milkings the cooling chamber is disconnected and stored in the freezing compartment of the household refrigerator to ensure some ice formation in the cooling water. It is useful to have some free water in the chamber at the commencement of cooling to assist transfer of heat from the cream in the early stages of cooling.

To obtain a lower temperature in the cooling medium a mixture of ice and salt could be used, or one of the special types of low freezing temperature solutions, for example, glycerine, could replace the water and ice mixture.

Special precautions are necessary with these alternative solutions however, to prevent excessive corrosion with brine solutions and possible freezing of a layer of cream onto the surface when low temperature solutions are used for cooling.

A plan of this unit is illustrated in Plate 1. It can be constructed either of tinned metal or stainless steel. It is suited for attachment to the cream spout or, with altered dimensions, can be constructed to rest across the neck of the cream can. Cream enters the tray from the separator and falls in an even film through the holes onto the external surfaces of the cooling chamber. During its passage over the cooling chamber, heat is removed from the cream by the cooling ice stored within.

The cooling unit described in this article is in use on the property of Mr. R. Falkenhagen, Woolooman, via Rosevale. During the August-November months temperatures of cream were taken before and after cooling for several milkings and are tabulated:

Month	Milking	Number of Tests	Average Atmos. Temp. (°F)	Average Cream Temp. ex Separator	Average Cream Temp. in Can (°F)	Temperature Fall (°F)
August ..	a.m.	4	54½	83½	70	13½
October ..	a.m.	2	67½	87	73½	13½
November ..	a.m.	6	64	87	69	18
November ..	p.m.	6	75	89	72	17

It was noted during temperature checks that the temperature of cream off the cooler rose 2 deg. F. between the start and finish of cooling operations. Cream was separated through a unit of 75 g.p.h. capacity. During the checks 20–25 gal. of milk were separated, producing approximately 2 gal. of cream.

In order to store at the reduced temperature, the can of cream should be stood in a concrete trough containing water, and the exterior covered by towelling or a clean sack extending into the water.

Mr. E. B. RICE

100 Years of Queensland Dairying—III

Butter, Cheese, and Market Milk

By E. B. RICE, Director of Dairying

The early phases of the change-over from farm butter-making to factory production were discussed in the first part of this article, which dealt with the pioneering stage of the Queensland dairy industry between 1859 and 1900.

The earliest record shows that pasteurisation was adopted in Queensland in the dairy at Gatton Agricultural College in 1898-99. All the cream manufactured into butter at the dairy during that year was pasteurised and this treatment was

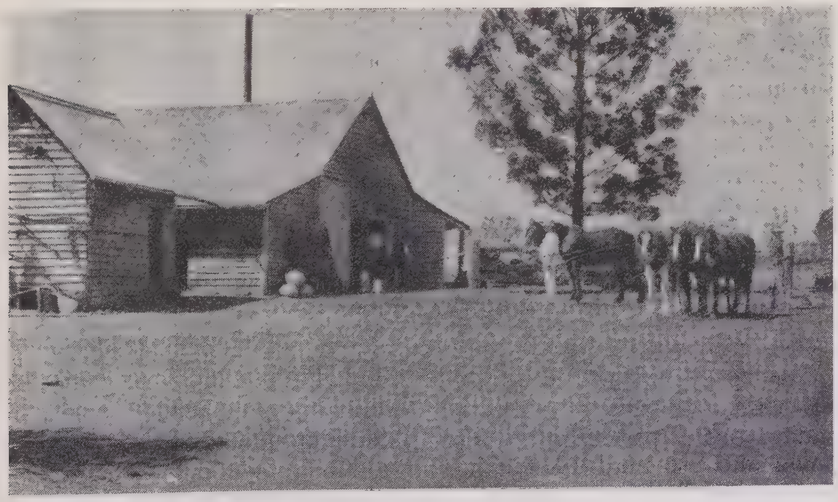


Plate 1

Purga Butter Factory, Which Operated From 1901 to 1914. The factory was situated nine miles from Ipswich and received cream from about a dozen suppliers. This photograph was kindly lent by Mr. M. H. Dick, of Purga.

continued thereafter. However, it is not recorded what type of pasteuriser was used.

The prevalence of a fishy flavour in our butter was mentioned in the early 1900's. It was not present in the butter immediately after manufacture but manifested itself in export butter by the time it reached England. The cause was baffling those connected with the butter industry in Australia and England, but was finally established in 1920 as the contamination of cream by traces of copper and iron. These traces came from the farm and factory dairy utensils and equipment.

In those early years, farmers' indiscriminate addition of preservatives to milk and cream was also a matter of concern. The quality of the cream reaching the factories was low; it was common for the cream to be so fermented as to ooze over the rim of the can.

Hamilton Cold Stores

The dairy factory at the Queensland Agricultural High School and College at Gatton was opened in 1911, and in 1912 the Government Cold Stores at Roma Street, Brisbane, commenced operations. They were closed when the Hamilton Cold Stores were constructed in 1924. These new cold stores were then the most modern and spacious in the Southern Hemisphere.

Pasteurisation of cream for butter manufacture had been introduced in a number of factories by 1914. The batch or holder system was first used, dome-type flash or instantaneous pasteurisers not coming into use until 1911, when the first installation was made at Warwick factory. Neutralisation of cream also began in this period.

In 1925, all butter factories had been equipped with pasteurisers. The export of choice or first grade butter was prohibited by Commonwealth Government legislation from August, 1924, unless it was made from pasteurised cream. This had the effect of compelling all factories to install pasteurisers for the treatment of all cream from that date.

Systems for deodorising cream used in butter manufacture were introduced in the mid 1920's, but the original systems have now been entirely displaced by modern vacuum pasteurisation techniques. The first vacreator was installed in Kingston factory in 1934 and the first Creamery Treatment Unit, in which a cream-steam counter flow principle is employed, was installed in Booval factory in 1955.

Wood taint and mould growth were common defects of Queensland butters in the 1920's; neither defect occurs now. The wood taint imparted by butter boxes made of Queensland hoop pine was overcome in 1930 by spraying the boxes of export butter with a casein-formaldehyde mixture.

About 1920, the trend began for new butter factories to be built as branches of existing companies rather than as independent units.

Organised Marketing

Organised co-operative marketing of butter was initiated in 1921 when a Queensland–New South Wales Butter Pool was formed to equalize the prices received for butter by each factory whether it sold on the more profitable local market or the lower-priced export market.

The Queensland Butter Marketing Board which now has statutory authority to control the marketing of butter sold intra-State, was constituted in February, 1925. It was not until 1936 that the Board established its own patting factory in Brisbane and displaced private butter packing firms. However, the Board has continued to allow wholesalers to distribute butter to retail sellers.

In 1955, the Board moved to a new factory which is considered the most modernly constructed and equipped butter packing and blending factory in the world.

The Gympie factory of the Wide Bay Co-operative Dairy Association, which was rebuilt in 1925, then had the highest butter production of any factory in Australia. Its output in 1925-26 was 3,547,949 lb.

In the early history of Queensland dairying, milk and cream were conveyed from the farms to the separating depots and factories by horsedrawn vehicles. A report in 1925 referred to motor transport gradually superseding horse-drawn vehicles for conveying cream to butter factories and two rail motors for conveying cream were constructed by the Railway Department.

Equalization

In 1926, the Kangaroo brand was introduced for butter exported to Britain. The Paterson scheme also introduced then, was the forerunner of the voluntary Australia-wide equalization scheme which came into effect in 1934. The Paterson scheme provided for a levy to be imposed on all butter and cheese produced within Australia, and bonus payments on exports. Under the Equalization Scheme, the returns to manufacturers of butter and cheese are equalized, irrespective of whether the produce is sold on export markets or within Australia.

Plate 2

Grading Butter At Brisbane about 1907. On the left is Mr. G. S. THOMSON, Queensland's first butter expert. Two of the men with him are Mr. R. WINKS and Mr. J. WILSON.

Experiments in producing unpreservatised butter were commenced in 1924. All butter exported up to that time was preservatised with boric acid. In 1927, the British Ministry of Health prohibited the use of preservatives in butter and they have since then been forbidden under the provisions of the Dairy Produce Acts.

In 1926-27 the official quality gradings of Queensland butter were 35 per cent. choice, 42 per cent. first, 15 per cent. second and 8 per cent. third grade.

In the earlier years, most factories were constructed of wood, but a change to brick construction became evident between 1920 and 1930 and all factories have since then been required to be of brick or concrete.

Dairy Research

The nucleus of a scientific staff to specialize in dairy industry problems was the appointment in 1930 of a University graduate (Mr. O. St. J. Kent) to carry out chemical and bacteriological examinations. Results of the first detailed bacteriological examinations of Queensland butters were reported by Mr. Kent in the 1932 Annual Report of the Department.

A Dairy Research Laboratory was established in 1935. A scheme to assist factories to control the moisture and salt contents of butter was introduced by the Dairy Research Laboratory in 1937. This was called the Butter Standardization Scheme, which was changed in 1939 to the Butter Improvement Service whereby bacteriological tests were also included. Further tests subsequently embraced in the scheme were pH, microscopic examination for thoroughness of moisture incorporation and extraneous matter.

Differentials in prices of cream paid to suppliers of butter factories were introduced by a regulation under the Dairy Produce Acts in 1936. Choice grade cream was paid for at ½d. a lb. commercial butter over first grade and first grade was 1d. a lb above second grade. All previous regulations under the Acts were revoked in this year and new regulations, based on changes in the industry were substituted.

In 1939, a churn with a capacity of 100 boxes of butter was installed in Malanda factory. The first metal churn was installed in Laidley factory in 1942, but this type was unsuitable for Queensland conditions and was discarded after a couple of years. Suitable types have since been developed and there are now 22 metal churns in Queensland factories. The first installation was made at Kingston factory in 1956.

THE CHEESE INDUSTRY

At the National Agricultural and Industrial Association of Queensland exhibition in 1891, a special prize was awarded to Daly Brothers, Quinalow, for the best Queensland-made cheese. This certificate is now possessed by Mr. M. Daly, Woodford.

A co-operative cheese factory was opened at Pittsworth in 1896. The Pittsworth Co-operative Dairy Association soon became the highest cheese-producing company in the State, and retained this position until displaced in 1945-46 by the Downs Co-operative Association which built a large central cheese factory in Toowoomba.

The contrast between the scale of manufacture in cheese factories at the beginning of the century and present-day factories is reflected by a reference in 1902 to the Pittsworth factory, then the largest in the State, receiving 1,200 gallons of milk daily.

In 1914, Queensland became the highest cheese-producing State and retained this position until 1935-36, when it was displaced by Victoria. Pasteurisation of milk in cheese factories began about 1914, but inability to import pasteurisers during the first world war hindered progress.

In 1942-43, Queensland again achieved the position of premier cheese-producing State. However, its ranking was short-lived as Victoria again overtook Queensland production in 1943-44 and has continued to be the leading State. South Australia now ranks second and Queensland third.

There were 94 cheese factories in 1920, the highest number ever in the State. Prior to this year, there was no uniformity of size of cheese produced for the export trade, but in that year a standard 80 lb. size was adopted by all factories for such cheese.

A Cheese Pool Act was proclaimed in 1921 to provide for the formation of a Cheese Board and equalization of returns to factories whether their cheese was sold locally or exported. But even in 1910, a Downs Co-operative Cheese Factories Association had been formed, mainly to deal with the high prices then charged for cheese crates and in 1913 a Queensland Cheese Manufacturers Association was formed, which in 1914 fixed prices for cheese sold locally.

A mammoth cheese, weighing 1½ tons, was made at Pittsworth factory in 1923 and sent to the Wembley Exhibition in London.

Plate 3

Dairy Cattle at Talgai West in 1912.

The need for refrigerated holding rooms at cheese factories and the fact that none was then in existence was mentioned in 1926. The first refrigerated cheese holding room was provided at the Malling factory in 1930. In 1958, 18 out of 24 factories had refrigerated storage rooms.

In 1930, only about half of the cheese produced in the State was made in factories which had milk pasteurisers installed. In 1958, all cheese factories, excepting two with small outputs, manufactured cheese from pasteurised milk.

Rehabilitation

The cheese industry in 1937 had reached a stage where factory buildings and equipment were generally in an unsatisfactory condition and cheese quality was poor. The industry and the government agreed that rehabilitating action was necessary. In attempting to meet competition for milk supplies from butter factories, cheese factories had for some years paid as high a price as possible for these supplies with the result that maintenance of factory buildings and equipment had been seriously neglected and cheese quality was causing much concern.

A scheme was implemented by the Department of Agriculture and Stock in 1938 whereby cheese manufacturers were required to make a gradual but effective improvement in rebuilding or renovating factories and installing more efficient equipment. At the same time, they were given more technical help from Departmental officers with a view to raising the general quality of Queensland cheese production.

A travelling dairy laboratory, with the author in charge, commenced operations among Downs cheese factories in 1938. This had for its purpose the giving of greater technical help in the industry's problems. The work at first was concentrated on carrying out tests for milk quality, advising farmers on quality milk production and introducing improved methods of control of starters in factories.

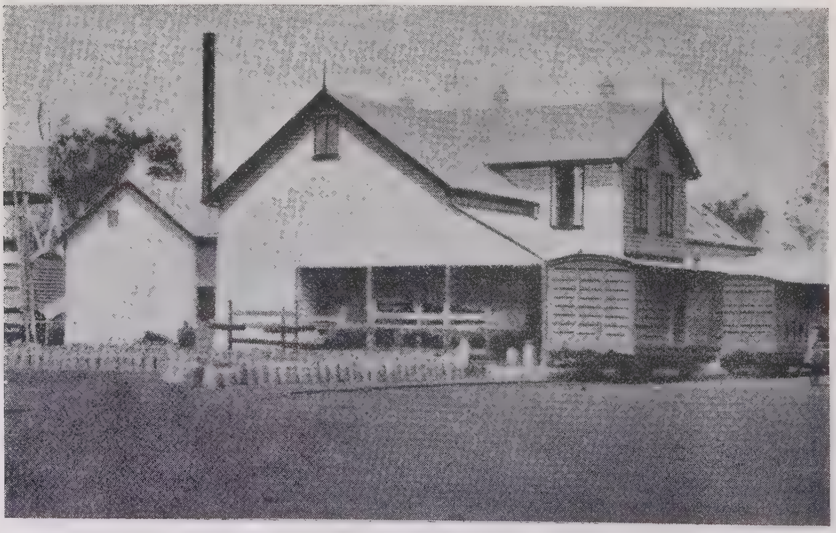


Plate 4

The South Burnett Co-operative Butter Factory at Murgon in 1914.

Quite a number of small cheese factories were closed during the early phase of the cheese industry rehabilitation scheme, the supplies being diverted to larger central factories. Up to this time, most cheese factory suppliers lived not more than two to three miles from their factory, but organized transport of milk supplies to cheese factories was then introduced by several associations in conjunction with this centralized manufacturing development.

Organized motor lorry pickup of milk supplies for cheese factories enabled milk supplies to be drawn from more distant farms and nowadays few suppliers convey their own milk to a cheese factory.

Although, since 1904, some grading of cheese had been carried out, it was not until 1940 that systematic grading of cheese for local sale and processing in Brisbane was instituted.

Expansion Scheme

About two years after the cheese rehabilitation scheme was commenced, a further development had a market effect on the cheese industry. In 1940, the British Government was concerned about the cold storage position for butter in the event of enemy bombing of British cold stores and requested the Australian Government to reduce butter exports but at the same time increase cheese exports. A scheme known as the Cheese Production Expansion Scheme was implemented.

Fifteen new cheese factories were established and 35 existing factories were enlarged and provided additional equipment to handle greater milk supplies. This scheme culminated in the State's record cheese production of 28,501,000 lb. in 1942-43; its monetary value exceeded £1,000,000 for the first time!

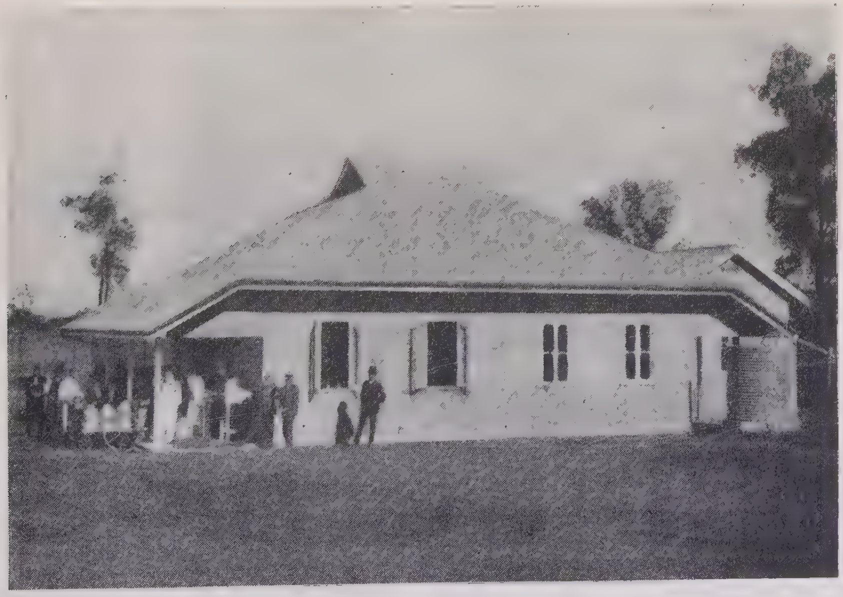


Plate 5

The New Dairy at Queensland Agricultural College, Gatton, in 1912.

Plate 6

Farmers Arriving With Milk at Cambooya Cheese Factory in 1919.

Cheese production then commenced to fall, due to a reversion of some suppliers to producing cream for butter manufacture.

The payment to suppliers of price differentials, according to the methylene blue test for milk quality, was introduced by two factories in 1940. It was not until September, 1957, that compulsory grading of cheese factory supplies by this test was instituted; the minimum differential for first grade milk was fixed at 2d. a lb. butterfat more than for second grade.

A number of cheese factories had commenced to wax cheese in 1939, but as waxing of cheese for export to Britain was prohibited during the war years, interest in this method of covering cheese lapsed, excepting among a few factories which had large local sales.

Whey separators were in use in three cheese factories in 1945, and thereafter were installed in all of the larger factories.

In the post-war years, hydraulic cheese presses, whey separators, water-seal lids for bulk starter cans, mechanical curd stirrers, automatic temperature and humidity control systems for cheese holding rooms, and *all-stainless steel* plate type pasteurisers, cheese vats and other equipment were features of progress in cheese factories. Whey powder was made by the roller process in the Toowoomba factory in 1949 from whey condensed in a double-effect condenser. There had been a changeover since 1939 to 1,000 gallon cheesemaking vats in most factories. The 650 gallon vat was previously the largest size used.

From the first efforts to rehabilitate the cheese industry in 1938, steady progress was made in the improvement of cheese quality. Only 36·8 per cent. was first grade in 1937-38, but in the record quality year of 1957-58, the percentage so classified was 88·2. In 1955, with the development of plastic-type film for the covering of cheese instead of the conventional cheese bandage, the Queensland industry commenced to package cheese for local sale in consumer-size, rindless cheese packs. Associated with this development, which has been quite rapid, a marked improvement in the presentation of cheese on the local market has been a creditable achievement of the cheese industry. From January 1, 1959, all cheese exported to England was waxed. This action was taken voluntarily by the Australian cheese industry.

Since 1955, several cheese factories have diversified the types of cheese made. Among the varieties produced are Gouda, Edam, Taffel, Carraway seed, smoked and clove cheeses. Gruyere and Roman cheese have been made at the Malling factory for many years.

THE MARKET MILK INDUSTRY

From the inception of settlement in the State until the turn of the present century, all milk consumed in Brisbane was produced on nearby suburban dairy farms.

Early records indicate that in 1902, milk was first brought to Brisbane by rail from outlying areas such as Bald Hills and Strathpine and later from Rosewood, Lowood and Caboolture. This was brine cooled, stored in cans in cold rooms and distributed by retail vendors.

The retail distribution method was to place the milk in a can fitted with a tap. The vendor poured out the quantity purchased by the householder into a measure, placed this milk in another vessel and transferred the milk into a jug or billycan left by the consumer on his doorstep.

Bottled, chilled raw milk was distributed from two small establishments in Brisbane in 1912. Pasteurisation of milk for city consumers was first commenced in 1919 in a factory at North Quay in Brisbane owned by Brisbane Milk and Ice Co. and at a factory in Ipswich owned by Pommer Bros.

The railway strike in 1927 led to the abandonment of rail transport for bringing country milk supplies into Brisbane and since that year all country supplies have been sent to Brisbane by road transport. However, in the early stages the milk was simply conveyed in milk cans and mostly was not even chilled before commencing its journey.

In 1928, about 1,000 gallons (5 per cent.) of bottled pasteurised milk were sold daily in Brisbane,

Plate 7

The Southern Queensland Dairy Company's Butter Factory at Kingston, Which Was Established in 1906 and Rebuilt in 1932.

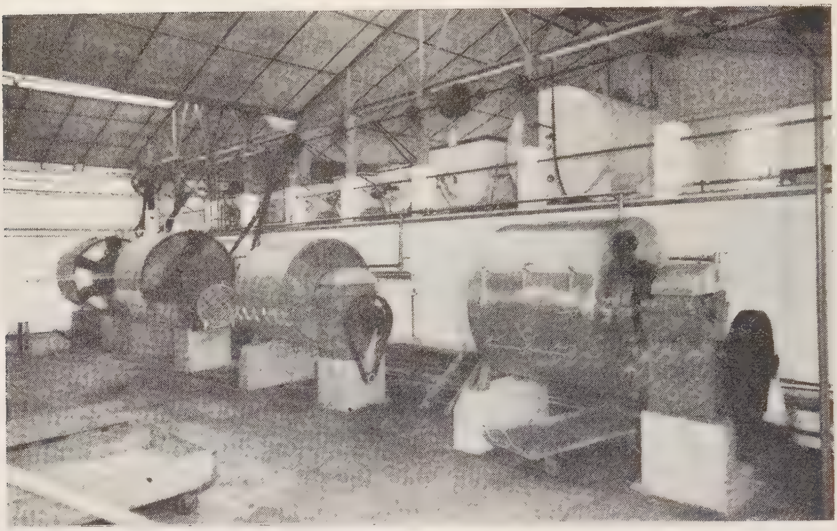


Plate 8

Kingston Butter Factory's Churn Room After Installation of Stainless Steel Churn in 1956.

3,000 gallons (17 per cent.) of pasteurised milk (unbottled), and 14,000 gallons (78 per cent.) of raw milk.

The market milk industry was in a chaotic condition during and just after the depression years of 1930's. This was due to cut-throat competition on the Brisbane market through supplies being brought into the city from additional country areas. A Milk Supply Act, which was passed in 1938, provided for the formation of the Brisbane Milk Board and the organised marketing of Brisbane milk supplies. It also provided for approval to be given for companies outside Brisbane to be given the exclusive right to supply pasteurised milk for a period of years within a defined area. This Act was repealed by the Milk Supply Act of 1952, which provided additional powers for the organised marketing of milk.

During 1938, about 4,000 gallons (20 per cent.) of milk were sold daily in Brisbane as bottled pasteurised milk, 6,000 gallons (30 per cent.) as heat-treated, unbottled milk, and 10,000 gallons (50 per cent.) as so-called "warm" milk (suburban producer-vended milk), or chilled milk (which was milk received from country centres, brine-cooled, but not pasteurised, on arrival in Brisbane).

A systematic laboratory control service as well as a programme of investigational work was commenced in the Dairy Research Branch in 1939.

In 1944-45 the quantities of milk distributed in Brisbane were 41 per cent. as bottled pasteurised milk, 38 per cent as pasteurised but not bottled (mainly shop and hotel trade) and 21 per cent. as chilled or warm milk.

Road Tankers

Another development was the receival of bulk supplies of milk cooled at country factories, placed in insulated road milk tankers and conveyed to Brisbane milk factories for pasteurisation. This system commenced in 1947 and in 1958 supplies were received from 13 country factories, representing 62·4 per cent. of milk receivals by pasteurisation factories in Brisbane.

In 1952, a road milk tanker commenced to convey milk from Malanda to Townsville, a haul of 234 miles; some of this milk was then sent by railway a further 603 miles to Mt. Isa. A milk bottling plant was erected in that town in 1958.

The high-temperature, short time method of pasteurisation (162 deg. F. for 15 sec.) was approved under the Health Act in 1946. Before that year, the holder or batch system (145 deg. F. for 30 min.) was the only officially approved method of pasteurisation of market milk. By 1956, all Queensland milk pasteurisation factories were using the HT-ST method.

A further development in the market milk section of the industry was the railing of milk from Toowoomba to Charleville and Cunnamulla in 1955. It was bottled on arrival and then distributed to consumers. This was a step to enable an increased availability of milk in western Queensland towns, where winter shortages are common. In 1958, a service was provided by the Port Curtis Co-operative Dairy Association for towns on the Central Western railway. The milk was forwarded from Rockhampton in refrigerated railway waggons and placed in cold rooms in the towns before distribution.

In 1956-57, the quantity of bottled pasteurised milk sold in Brisbane averaged 42,600 gal. daily; warm milk had completely disappeared as a type of milk, but raw milk sales averaged 1,850 gal. daily; and the quantity of non-bottled pasteurised milk sold (mainly for cafes, hotels, etc.) averaged 4,500 gal. daily. Unpasteurised milk thus represented less than 4 per cent. of sales.

Pasteurisation of milk has been extended to most of the larger towns and their environs through the establishment of milk pasteurisation plants of which there were 15 in country centres in 1958. The first country town to be catered for by a pasteurised milk supply was Southport in 1937. The next country town in which a milk pasteurisation factory was established was Toowoomba, in 1940.

The school milk scheme, whereby each school child is given a one-third pint bottle of pasteurised milk, was commenced in 1952-53 and has been extended to all areas where bottled pasteurised milk is available.

[TO BE CONTINUED]

* * *

David Brown 900 D Tractor

The technical report on the David Brown 900 D tractor, made following a test by the Australian Tractor Testing Committee in January, is now available. Copies may be obtained free of charge on application to the Department of Agriculture and Stock, William Street, Brisbane.

Tuberculosis-Free Cattle Herds (As at 1st November, 1959)

Aberdeen Angus

Crothers, G. H. & H. J. "Moorenbah", Dirranbandi
Elliott, A. G., "Ooraine", Dirranbandi
Mayne, W. H. C., "Gibraltar", Texas

A.I.S.

Cox, T. L. & L. M. J., Seafield Farm, Wallumbilla
Crookey, J., Arolla A.I.S. Stud, Fairview, Allora
Davis, W. D. "Wamba", Chinchilla
Dennis, L. R., Diamondvale, A.I.S. Stud, Mundubbera
Edwards Bros. "Spring Valley", A.I.S. Stud, Kingaroy
Evans, E. G., Lauraven A.I.S. Stud, Maleny
Green, D. B., Deloraine, A.I.S. Stud, Fairdale
Heading, C. A., "Wilga Plains", Maleny
Henry, Mrs. K., Greenmount
Henschell, W., "Yarranvale", Yarranlea
H. M. State Farm, Numinbah
Littleton, H. V., "Wongalea", Hillview, Crow's Nest
Marquardt, A. C. & C. R., "Cedar Valley", Wondai
Mears, G. S. & E., M. S. 755, Toogoolawah
Moore, S. R., "Sunnyside", West Wooroolin
Neale, D. G., "Groveley", Greenmount
O'Sullivan, Con., "Navillus", Greenmount
Phillips J. & Sons, "Sunny View", Benair, Kingaroy
Power, M. F., "Barfield", Kapaldo
Queensland Agricultural High School & College, Lawes
Radel, R. R. & Sons, "Happy Valley", Coalstoun Lakes
Roche, C. K., Freestone, Warwick
Sanderson, W. H., "Sunlit Farm", Mulgildie
Schloss, C. J., "Shady Glen", Rocky Ck., Yarraman
Scott, M. E. & E., "Wattlebrae", A.I.S., Stud, Kingaroy
Scott, W. & A. G., "Walena", A.I.S. Stud, Blackbutt
Shelton, R. A. & N. K., "Vuegon" A.I.S. Stud, Hivesville, Murgon
Sokoll, A. H., "Sunny Crest", Wondai
Sperling, G., "Kooravale", Kooralgin, Cooyar
Sullivan Bros. "Valera", Pittsworth
Sullivan, D. "Bantry", Pittsworth
Sullivan, F. B., "Fermanagh", Pittsworth
Thompson, W. H. "Alfavale", Nanango
Webster, A. H., "Millievale", Sabine, via Oakey
Wieland, A. W., "Milhaven", A.I.S. Stud, Milford, via Boonah

Ayrshire

Dudgeon, C. E. R., Marionville Ayrshire Stud, Landsborough
Dunn, T. F., "Alanbank", Gleneagle
Goddard, B., Inverell, Mt. Tyson, via Oakey
Holmes, L., "Benbecula", Yarranlea
Mathie, E. & Son, "Ainslie", Maleny
Scott, J. N. "Auchen Eden", Camp Mountain
Zerner, G. F. H., "Pineville", Pie Creek, Box 5, Post Office, Gympie

Friesian

Behrendorff, E. C., Inavale Friesian Stud, M.S. 786, Boonah
Macdonald, S. E. G., "Freshfields", Marburg
Naumann, C. H., "Yarrabine", Yarraman
Pender, D. J., Lytton Road, Lindum
Stumer, A. O., Brigalow, Boonah

Guernsey

Doss, W. H., Degilbo, via Biggenden
Fletcher, A. B. "Cossart Vale", Boonah
Holmes, C. D. (owner Holmes L. L.) "Springview", Yarraman
Johnson, G. L. "Old Cannindah", Monto
Miller, G. "Armagh Guernsey Stud", Armagh, M.S. 428, Grantham
Ruge, A. & Sons, "Woowoonga", via Biggenden
Sanderson, N. H. "Glen Valley", Monto
Scott, C., "Coralgrae", Din Din Rd., Nanango
Swendson, A. C., Coolabunia, Box 26, Kingaroy
Wissemann, R. J., "Robnea", Headington Hill, Clifton

Jersey

Beckingham, C. Trout's Rd., Everton Park
Birt, W. C. M., Pine Hill Jersey Stud, Gundiah
Borchert, Mrs. I. L. M., "Willowbank" Jersey Stud, Kingaroy
Burrows, R. N., Wondai, Box 23
Bygrave, P. J. L., The Craigan Farm, Aspley
Carpenter, J. W., Flagstone Ck., Helidon
Conochie, W. S. & Sons, "Brookland", Sherwood Rd., Sherwood
Cramb, S. A., Bridge St., Wilsonton, via Toowoomba
Crawford, R. J., Inverlaw, Kingaroy
Farm Home For Boys, "Westbrook"
Fowler, P. & Sons, "Northlea", Coalstoun Lakes
Harley, G., "Hopewell", M.S. 189, Kingaroy
H. M. State Farm, Palen Creek
Hutton, D. R., "Bellgrath", Cunningham, via Warwick
Johnson, H. G., Windsor Jersey Stud, Beaudesert
Lau, J. F., "Rosallen", Goombungee, Toowoomba
Matthews, E. A., "Yarradale", Yarraman
McCarthy, J. S., "Glen Erin", Greenmount, Toowoomba
Meier, L. E., "Ardath Stud", Boonah
Noone, A. M. & L. J., "Winbirra", Mt. Esk Pocket
Porter, F., Conondale
Queensland Agricultural High School & College, Lawes
Ralph, G. H. "Ryecome", Ravensbourne
Scott, Est. J. A., "Kiaora", Manumbar Rd., Nanango
Semgreen, A. L., "Tecoma", Coolabunia
Seymour, B. T., "Upwell", Jersey Stud, Mulgeldie
Smith, J. A. & E. E., "Heatherlea", Jersey Stud, Chinchilla
Tatnell, W. T., Cedar Pocket, via Gympie
Toowoomba Mental Hospital, Willowburn
Verrall, F. W., "Coleburn", Walloon
Weldon Brothers, "Gleneden", Jersey Stud, Upper Yarraman

Poll Hereford

Anderson, J. H. & Sons, "Inverary", Yandilla
Hutton, D. R. & M. E., "Bellgrath", Cunningham, via Warwick
McCamley, E. W. G., "Eulogie Park", Dululu
Maller, W., "Bore View", Pickanjinnie
Wilson & McDouall, Calliope Station, Calliope

Poll Shorthorn

Leonard, W. & Sons, Welltown, Goondiwindi

Bucket and Bail

Save Money on Cream Cans. Careful handling, right from the time they come brand new from the store, will prolong the useful life of milk and cream cans. Neglected or roughly treated they will quickly deteriorate and become unsuitable for carrying dairy produce.

From the time you start using them, the cans are exposed to attacks by acid milk and cream and by washing solutions. The action of these substances gradually destroys the thin layer of tin on the cans. The steel is then exposed and rusting will commence. Unchecked, rust will quickly eat right through a can, making the re-tinning more expensive.

Exposed steel in a can imparts a tallowy and oxidised flavour to milk and cream. This flavour cannot be removed during butter-making, and the cream has to be down-graded.

To prolong the life of cans here are some precautions:

1. Wash your cans thoroughly and sterilize them with boiling water or steam. Stand them upright until the steam has escaped and the can has dried; then turn them upside-down on a dust-free storage rack. If possible, always wash up in rain water.

2. Use cleansers at the correct strength, and use stiff bristle brushes. Never use steel wool or metal fabric, as these quickly cut off the tinning.

3. Rinse the cans with the chlorine solution (at the correct strength) only a few minutes before use. Never rinse with a chlorine solution after washing up.

4. Inspect the cream stirrer for sharp edges. Use the stirrer by plunging it up and down in the can; don't roll it around the sides of the can.

5. If cans are not being used for long periods, wipe them over with an oily rag and store in a clean, dry place. Wash thoroughly and air before use.

—N. E. FOWLER,
Dairy Officer.

Using Gouge Dehorners. Gouge or cup dehorners allow you to dehorn all the season's calves at the one time. This is their big advantage. Gouge dehorners can be used on calves from three to nine months old. This makes them especially suitable for use on beef breeding properties where frequent musters to treat calves soon after birth would not be possible.

The risk of infection developing after dehorning with the gouge type instrument is only slight. You can reduce this risk still further by working in clean surroundings and keeping the dehorners in an antiseptic solution when they're not actually in use. Tie a bucket of antiseptic solution to a fence rail so it won't get knocked over, and after you've dehorned each calf put your dehorners in it. Replace the solution frequently so it's always clean.

Before you start, make sure your dehorners are properly adjusted and sharp. Have your calves properly restrained, either in a branding cradle, a calf sword bail or securely held or tied.

To use gouge or cup dehorners, place the instrument over the base of the horn. Aim to remove about a quarter of an inch of skin around the horn base along with the horn. In practice, you'll find it necessary to cut as low as possible. With the dehorners in position and the calf restrained, remove the horn by snapping the handles to the closed position. If the job is done properly, the animal will be completely polled.

Stubs or scurs are the result of failure to remove the growing buds at the horn base. This is usually caused by lifting the dehorners at the time of cutting. Avoid this by keeping the dehorners pressed to the calf's head while you are snapping the handles into the closed position. If your dehorner is clean, there's no need to put any ointment or dressing on the wound.

From this start you'll learn by experience how to dehorn successfully. Observe the results and you'll soon know the right time and age to get the best results.

—W. F. MAWSON,
Senior Adviser in Cattle Husbandry.

Save Money on Milking Buckets. Care in handling dairy buckets will lengthen their life and save the farmer the constant expense of having to replace them. All too often, comparatively new buckets lose large areas of tinning through rough handling, and then these areas are allowed to rust.

A rusty or badly scored bucket is unsatisfactory for handling dairy produce. Rusted surfaces are difficult to clean and may be a breeding ground for harmful bacteria. The rust may also cause the oxidation of the butterfat in the milk and cream. Both of these faults can cause the produce to be downgraded—a loss to the farmer.

Possibly the greatest cause of worn buckets is the practice of telescoping them after washing up. The steel bottom rims score the insides of the overlapping buckets and continuation of the practice causes large areas of steel to be exposed. This attempt to save space on the draining racket is not worth the cost of early retinning.

Tinning can also be damaged by using the buckets to hold the hot cleaning solution for the milking machine. Because they are in contact with the surface of the bucket for so long, these acid or alkali solutions will eventually remove the tinning. Choose your oldest bucket for this purpose and reserve it solely for holding cleaning solutions. If you have to store your buckets, smear them lightly but thoroughly with petroleum jelly.

—D. C. KEATING, Dairy Officer.

Plan Now For December

Mate cows now to ensure seasonal calving.

Repair roofs and tanks to catch all available rain-water for cleaning operations.

Destroy flies and breeding grounds and protect milk quality.

Check your breeding records. Call in your vet. if necessary.

Hormone Treatment For Fattening Steers

By D. N. SUTHERLAND,
Director of Cattle Husbandry.

Here are the results of tests on the use of hormones for fattening cattle in Queensland.

The treatment of feed-lot cattle with hormones in U.S.A. is now well-established. Producers are interested in the possibilities of the use of hormones for fattening in Queensland. Since there are differences in the type of feedstuff available here and also considering that the method of treatment would necessarily vary it has been necessary to gather as much information as possible under Queensland conditions.

During the past three years, observations have been made on about 600 head of steers or bullocks on 12 different properties. Growth rate performance on native pastures, improved pasture and crop have been observed. Properties on the Darling Downs, Burnett and Far North Queensland have been included in the investigations. In addition to weight gain performance, carcass measurements and observations have been made where possible.

The information which follows summarises work to date, and the recommendations are based on local experience:

Male cattle (steers or bullocks) only have been treated. Results with treatment of fattening heifers have been variable in other parts of the world. More information is required before recommendations can be made for this class of animal.

Breeding animals of either sex should not be treated.

Extreme care is necessary to ensure that no residue of the tablet is present in any edible meat. No variation from the recommended site for injection should ever be made.

What Are Hormones?

Hormones are chemical substances which occur naturally in the body of animals, where they regulate various activities. There are several different kinds, each with a separate function. The proportion of various types of hormone occurring naturally in animals varies with the sex of the animal. Thus, reference is sometimes made to a "male" hormone or a "female" hormone.

The chemical compositions of some naturally occurring hormones have been established and these can now be manufactured by chemical means. Hexoestrol is the hormone which has been used most commonly in Queensland. It is a synthetic product similar to the natural "female" hormone called oestrogen.

Hexoestrol is made up commercially in tablet form—the common size at present contains 15 milligrams of hormone. The cost is about 6d. a tablet.

Methods of Use

Hormones can be either given in the feed daily or implanted under the skin. Mixing with the feed is practicable only under feed lot conditions. In Queensland, all observations to date have been made on grazing animals which have been treated by the implantation method.

Implantation is made by means of an implantor which consists of a hollow needle fitted to a plunger. The tablets are injected by depressing the plunger after the point of the needle has been inserted under the skin of the ear. Because of the possibility that some residue of the tablets will be present at slaughter, it is essential that the site of implantation be as far removed as possible from edible meat. *Thus implantation should be made only in the ear.*

Dose Rates

Observations have been made on dose rates ranging from 15 mgm. to 60 mgm. Where comparisons have been made, it would appear that no advantage is obtained from dose rates exceeding 30 mgm. However, where feed of high quality is abundant throughout, the dose rate above 30 mgm. may be justified. On the other hand, increasing dose rates leads to intensification of undesirable carcass characteristics.

The Effect of Treatment

Hormones cannot take the place of a foodstuff. They are not a foodstuff in any way. The effect of hexoestrol implantation on steers or bullocks is to alter the proportion of muscle (lean meat) and fat which is produced from its feed by the animal. The hormone directs more of the absorbed nutrients from the feed into the muscle at the expense of fat. When animals are in a fattening state and have access to plenty of feed of suitable quality it is unlikely that this change due to hormone treatment will be excessive.

On the other hand, if the feed supply suddenly fails, hormone treatment is likely to produce a carcass which lacks "finish." This has led, in some cases, to downgrading and actual economic loss.

Implantation of ordinary store cattle serves no useful purpose since such animals are unable to take advantage of the treatment. It will be appreciated that hormone treatment does not start the fattening process but is only useful when the fattening is proceeding.

Undesirable Side-Effects

Some undesirable side-effects on the behaviour of the animals and on carcass conformation are usually evident. It has not been demonstrated that these alone are of a serious economic nature.

Treated animals show a tendency to mount their mates, particularly when mustered or yarded. A slackening of the pelvic ligaments

Plate 1

A Group of Steers Treated with Hexoestrol.

with consequent elevation of the tail head, sideways sloping of the rump and swayback are frequently seen. Excess development of the rudimentary teats and a thickening over the neck and shoulders have also been noted.

The Effect on Body Weight

Under appropriate conditions, hormone treated animals tend to gain weight at a faster rate. Taking the average of all observations, treated animals have shown an increased liveweight gain of 22 lb. a head. The range of increased weight of treated groups over untreated was from 4 lb. to 35 lb. The range in length of period of observation was from 56-169 days.

With a carcass price of £7 10s. for 100 lb., an extra 22 lb. liveweight is worth about £1.

It is thought that the increased gain stems partly from the fact that less feed is required to produce 1 lb. of meat than 1 lb. of fat. Since hormone treatment tends to favour meat production rather than fat, a greater weight of lean meat can be produced from a given amount of feed.

When the Gain Is Made

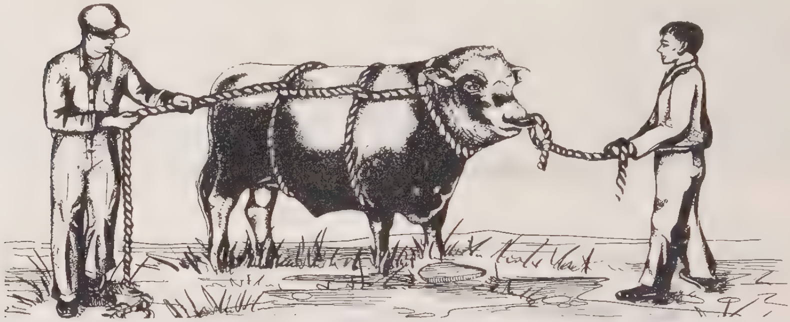
Implanted animals in suitable condition and on good quality feed tend to put on extra weight soon after implantation. This advantage appears to increase up to about 100 days and disappears at about 150 days. The best time for implantation is thus between three and four months before the expected date of turn-off.

To sum up—

- Hormones are not a foodstuff and will not promote fattening in animals.
- They should be used only on fattening steers or bullocks which are on plenty of good quality feed

and within five months of turnoff.

- There is no advantage in treating growing stock or backward stores. On no account should breeding stock be treated.
- Implant only in the ear of animals.
- There would appear to be risk of economic loss if using hormone implants on steers on native pasture under extensive conditions, unless marketing can be done at short notice. This is because of the difficulty of ensuring the necessary high plane of nutrition for up to five months after implantation.
- Great care should always be exercised when using the tablets. Treat them as a dangerous drug and store in such a way and place to ensure that they are not mistaken for any other medicinal material.



An Aid in Treating Cattle

How often have you put off a job because you weren't certain of how to tackle it? This is particularly the case in treating cattle, especially big animals. Moreover, complete restraint of the patient allows you to give thorough treatment.

Here is a method of casting or throwing cattle in preparation for branding, castrating, attention to feet, udders, head or many other parts of the body.

Firstly, tether the head by a halter or nose ring but allow sufficient slack rope for access to the head if tied to a fence. Now follow the diagram.

Tie one end of a strong 30 ft. rope around the neck of the beast with a non-slip knot. Take the rope over the withers and make a half-hitch around the body just behind the fore-legs. Then make another half-hitch around the body behind the ribs and immediately in front of the hip bones.

Standing at the rear and to one side of the animal, make a steady firm pull on the rope and the animal will sink to the ground without struggling or injury. The animal will go down on the side from which the rope is pulled.

The legs are next fastened in pairs, front to back above the fetlock. This is a precaution to protect the operator even where the front of the body is to be treated, for although the animal can't get up, it can kick.

Queensland Year Book, 1958

The 1958 issue of the Queensland Year Book is available in the main bookstores at the prices of 5s. for paper-covered copies and 7s. 6d. for stiff cloth-covered copies. Copies may also be obtained from the office of the Government Statistician.

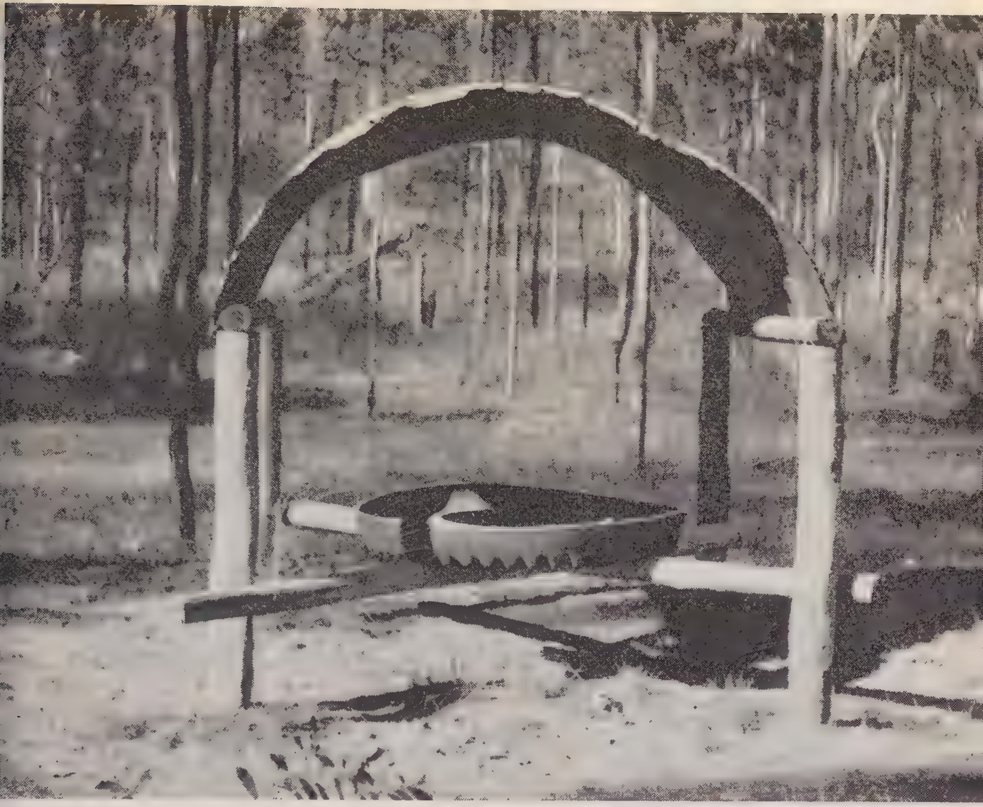


Plate 1: A General View of the Feeder.

A Cheap and Effective Lick Feeder

By P. C. DAVIDSON, Cattle Husbandry Branch

Mr. V. Smith, Melbadale, Dingo, has constructed a number of very effective lick feeders from materials that are available on most properties.

Phosphate deficiency of cattle is a problem encountered along extensive areas of coastal Queensland and northern inland districts. The feeding of bonemeal or boneflour is becoming a regular practice on many beef properties.

Where surface water is available to cattle for most of the year and no supplementary feeding is practised, the only practicable means of supplying a phosphate supplement to cattle is by licks.

A popular mixture consists of equal parts of boneflour (or bonemeal) and coarse salt. Parts are by weight. When stock are accustomed to such a mixture it can be changed to 75 per cent. bonemeal

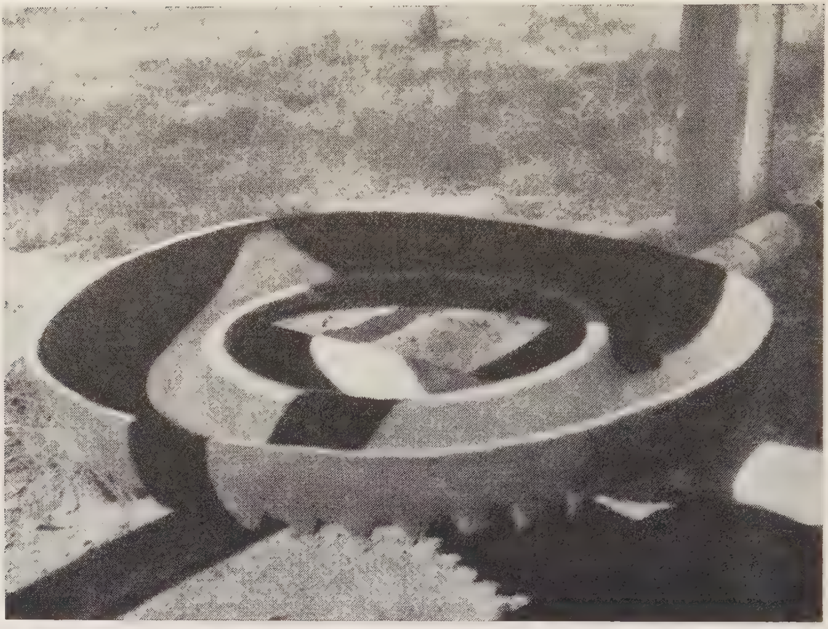


Plate 2

Close-Up of the Tyre Container.

and 25 per cent. salt if desired. The salt adds to the palatability of the mixture.

Covered lick feeding troughs are essential to prevent wastage caused by rain spoilage. Where uncovered troughs are used, it is necessary to discard most of the unused lick which has been dampened by rain.

This is all You Need

The materials required for the construction of Mr. Smith's type of feeder are usually plentiful and cheap. They consist of 8 poles of light bush timber, some number 8 wire, an old tractor tyre and half of a discarded 1,000-gallon tank.

The approximate dimensions are—

Distance between posts—6 ft. 6 in. to 7 ft.

Height from ground level to top rail—4 ft. 8 in.

Distance from ground level to bottom of tyre—1 ft. 7 in.

The tank should be flattened slightly for better coverage.

Construction

As can be seen from the illustration, the structure is very easy to make. The distances between posts and height of roof above ground level may be varied to suit but it is important that the bottom of the tyre be about 19 in. above ground level. At this height, cattle spill very little when eating. It is also sufficiently high to catch the tails of animals and so prevent dung and urine contamination in the feeder.

Advantages of this Type of Feeder

1. Construction is simple and quick, and apart from labour the cost is very low.

2. The lick is sheltered from the weather, thus cutting out wastage due to rain damage.

3. By the use of a circular trough such as this, more cattle are allowed to feed at one time. Boss cows can only control one quarter of the trough space at most. This leaves the remaining three-quarters for more timid cattle.

Position of Feeder

The feeder should be strategically placed in the paddock so that cattle will use it regularly. Since bonemeal and salt are heavy materials, motor transport of them is indicated. Thus, easy access by motor vehicle is desirable. Near watering places or cattle camps are ideal situations. If the feeder is in a convenient position it will be possible to check it regularly whilst inspecting watering facilities.

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THE FIGHT AGAINST DISEASE—III.

How Infectious Diseases Are Spread

By G. C. SIMMONS,
Senior Bacteriologist.

One of the important sides to the study of infectious diseases is how they pass from one animal to another and produce ill health. This is discussed here:

Many of the ancient laws relating to hygiene were based on observations that outbreaks of disease may originate in one area and then spread throughout a community. Consequently, isolation and quarantine have long been a standby to prevent epidemics. Nevertheless, it was only after the germ theory of disease was discovered that people realised that some such customs were based on sound principles.

Microbiologists have divided pathogenic micro-organisms into six groups: viruses, rickettsia, pleuropneumonia organisms, bacteria, fungi and protozoa. Although representatives of each of these groups may have their own special means of transmission there are some factors basic to all of them. These will be considered later, but firstly the source and reservoir of pathogenic organisms (pathogens or germs) will be briefly discussed.

Outside the host, the pathogen may be a temporary or permanent inhabitant of the environment. The duration of its existence outside the body often determines the ease with which a disease is transmitted. If it can survive for long periods, there is more chance that it comes into contact with a suitable host. It must be realised also that some organisms do not need to infect an animal in order to survive, but will multiply in soil, water or vegetation if conditions are suitable.

With most diseases, the infected animal is the important reservoir, for such animals shed numerous micro-organisms into the surroundings. There are two types of disseminators, the *clinically affected* animal and the *healthy infected* animal or *carrier*. During the course of most diseases there is a period in which the pathogen is shed from the body or occurs in the body in such a position that insects such as mosquitos can take up the infection. On recovery, the pathogen is usually eliminated from the body, but a small percentage of animals may continue to harbour it and shed it intermittently or continuously into the surrounding atmosphere. These are *carriers.*

Other animals may become infected and show no ill-health but remain shedders of the infectious agent and also are called *carriers.* It is easy to realise then the importance of recognising such carriers in any herd or flock when eradication or control of a disease is attempted. In tick fevers of cattle, the carrier state is deliberately produced to obtain immunity but such is an exceptional case.

Methods of Transmission

An animal may pick up an infection by three main methods:

(1) Contact with an infected animal.

(2) Contact with the infectious agent which is in the environment.

(3) Bites of insects.

For better consideration, method 2 is divided into Section 2a dealing with infection obtained by entry of the germ through the external surface of the animal; and 2b which considers infections where the pathogen enters the body through one of the external openings.

1. Contact with Infected Animal

Rarely is direct contact the method of transmission, necessitating as it does the physical contact between the donor and recipient of the micro-organism. There is a group of diseases where this method is important and these are the venereally transmitted diseases, such as bovine trichomoniasis. This type of transmission may depend on the host rather than the infecting agent. For example, bovine vibriosis is usually transmitted by service, but in ovine vibriosis caused by the same organism, venereal transmission is the exception. On occasions, stock such as cattle and sheep may be infected by bites from dogs carrying dangerous bacteria in their mouths.

2a. External Contact with Pathogen

External contact occurs when the pathogen is brought into contact with the external surface of the animal. Animals are constantly exposed to a wide variety of infections but have developed quite an efficient system of dealing with them before they can penetrate and set up the diseased state. Intact skin is impenetrable to all but a few pathogens. However, small scratches, cuts or abrasions of the skin may be all this is required to break down the skin barrier.

In many cases the host may be carrying the organism on its skin and infection occurs when the skin is altered by some influence either from outside or inside the body. Examples of this method of transmission are contagious pustular dermatitis of sheep and the fungal disease ringworm, which occurs in several animal species. Infectious agents transmitted by this method are often quite resistant and are able to survive for long periods in or on the ground.

2b. Introduction of the Pathogen into the Animal

Introduction of the pathogen into the animal is by far the most common method of infection. The introduction may occur by direct penetration of the body such as by wounds or by entry of the respiratory, oral, intestinal, or genito-urinary tracts or teat canals. The pathogen may cause immediate sickness or may lie dormant for a considerable period as in the case of blackleg of cattle.

Diseases occurring as a result of respiratory tract infection naturally include those which manifest themselves in the form of pneumonia, bronchitis, coughing and sneezing.

Coughing, sneezing and even breathing expel numerous droplets of moisture into the atmosphere. These droplets may contain the infectious agent. The large droplets soon fall and thereby pollute water or feed. If they fall and dry out, scattering of the germs may occur by the dust being carried by the wind.

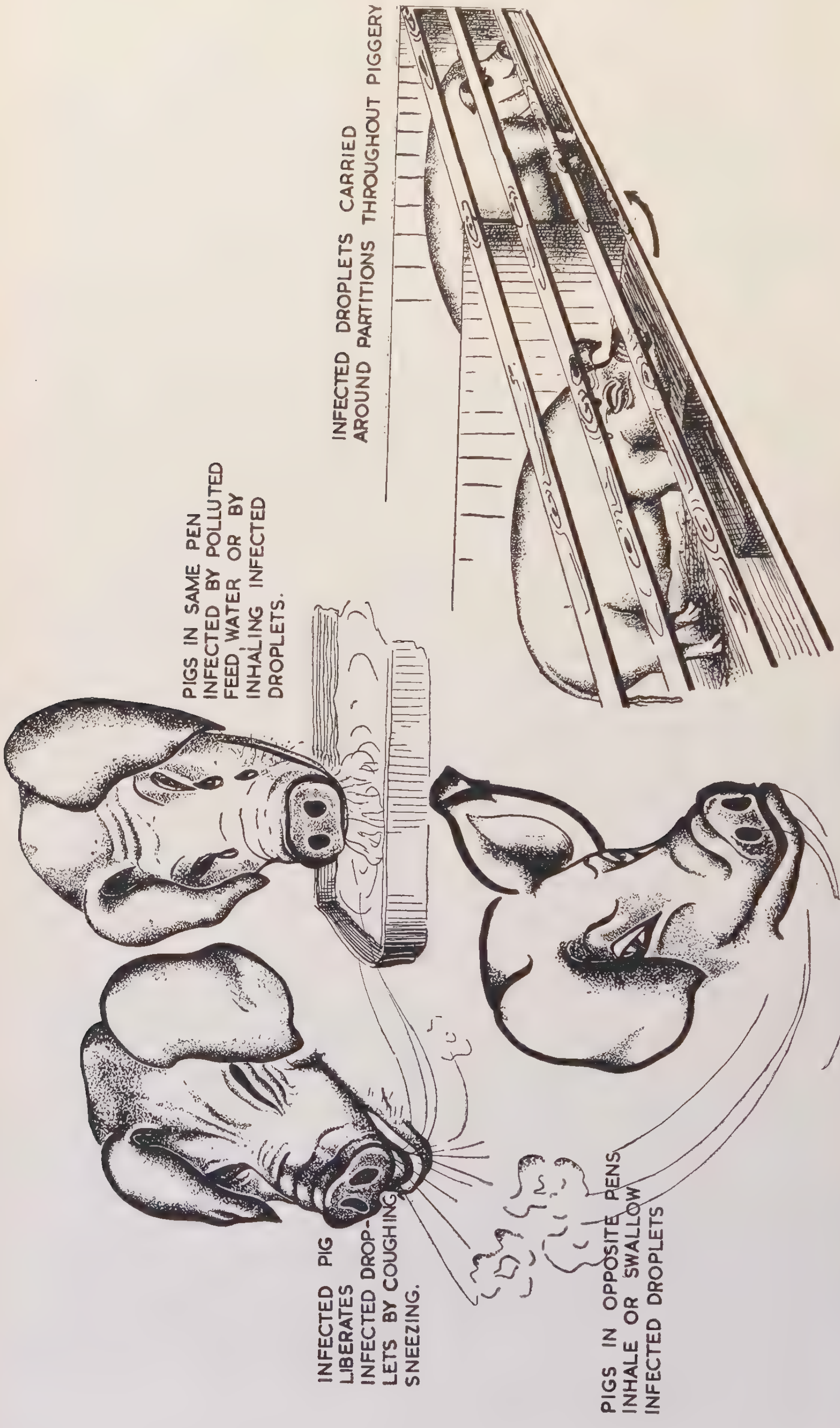

INFECTED DROPLETS CARRIED AROUND PARTITIONS THROUGHOUT PIGGERY
PIGS IN SAME PEN INFECTED BY POLLUTED FEED, WATER OR BY INHALING INFECTED DROPLETS.
INFECTED PIG LIBERATES INFECTED DROPLETS BY COUGHING SNEEZING.
PIGS IN OPPOSITE PENS INHALE OR SWALLOW INFECTED DROPLETS

Plate 1

A Method of Transmission of Disease.

Small droplets are very light and have a large surface area in comparison with their volume. As a result, they remain in the air for considerable periods and also tend to dry out quickly in the air.

If the pathogen is not killed during the drying process, the air may be heavily contaminated with small infective particles. Infectious laryngo-tracheitis of fowls and virus pneumonia of pigs are examples where droplet infection is important.

Swallowing of infectious agents is a common method of transmission. In many animal species, the stomach contents are very acid and will destroy many pathogens that are swallowed. This is probably true when Brucella infected milk is consumed by man.

However, just as food factors are drawn from the intestine into the tissues so may pathogens which survive the stomach journey pass through the wall of the intestine and eventually lodge and grow in sites suited to their particular requirements.

Other organisms may not need to leave the intestine but merely multiply in it and so disrupt normal functions that disease is manifested. Bacteriological examination of tissues from such a case will often result in the isolation of the pathogen, such as Salmonella, from the intestinal contents and associated lymph nodes but not from other tissues such as liver and spleen.

Few diseases enter by the genito-urinary system unless by direct contact as described under 1. The period when offspring are being born or just after is dangerous as the uterus and genital tract of the dam is then in a very susceptible state, and chance contact with

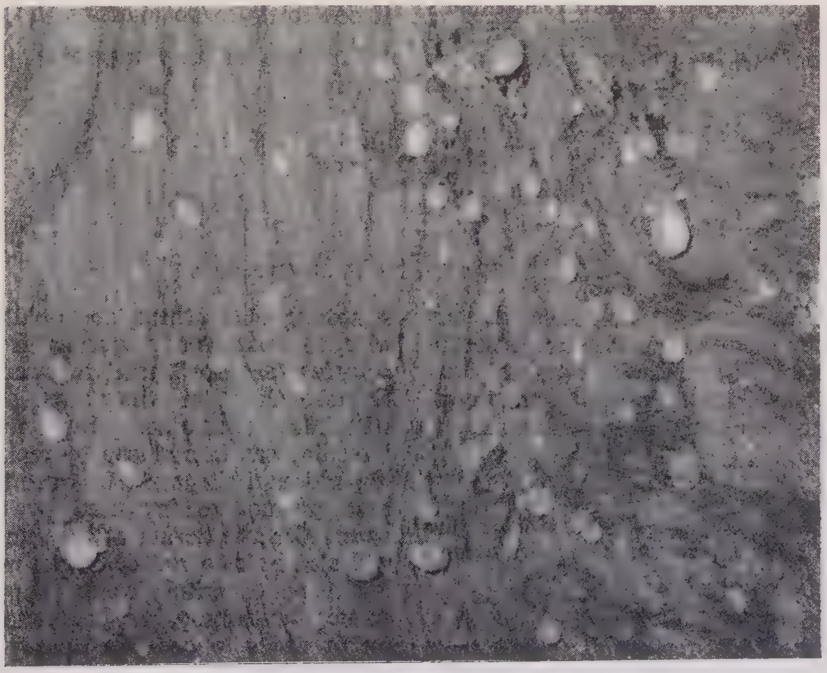


Plate 2

Cattle Ticks May Infect Cattle With Tick Fever Organisms.

pathogens in the environment may result in infection.

A man-made transmission of type 2a is that which occurs in mastitis. *Streptococcus agalactiae* is an organism which is only occassionally present outside the bovine udder. Experiments have shown that transmission of this disease is mainly by milkers' contaminated hands, milking machines and cloths used for washing udders.

The transport of infection from one place to another is obviously most important, particularly in this method of transmission and the ways in which this is done are many. Wind may transport micro-organisms or water may carry them along streams and drains. Pathogens are excreted in large numbers in excreta, urine and discharges from nose and mouth. Bedding, sheds, crates and soil can therefore become heavily contaminated. This material may then be transported on clothing or boots of attendants or by transport of crates or feed from one farm to another.

3. Vectors

Some diseases are transmitted by insects or other living agents which do not show any signs of ill-health as a result. In the case of fowl pox, the mosquito sucks infected blood from a fowl with fowl pox and transmits it to the next bird that it bites. The mosquito in this example acts merely as a mechanical carrier of the virus.

On the other hand, there are some mosquito-borne diseases in which the virus must develop within the insect before transmission is likely to take place. Some parasites have the ability to survive throughout the life cycle of the vector. This is so in tick fever of cattle.

Each micro-organism may have its own main method of transmission but most are capable of using several routes. A full understanding is therefore necessary of all means of transmission of a disease if control is to be effective.

[TO BE CONTINUED]

Prevent Bees From Swarming

Swarms of bees have already been reported this summer in south-eastern Queensland, even in Brisbane suburbs. Swarming may continue until the end of summer.

Commercial beekeepers look with disfavour on swarming. Departure of the swarm often reduces the strength of the parent colony during a nectar flow.

Swarming is a natural instinct, and for that reason it's very difficult to prevent. Some strains of bees have a greater tendency towards swarming than others, so you'd be wise to rear young queens from colonies that don't tend to swarm. Overcrowding in the hive also stimulates swarming. But overcrowding can be reduced by replacing old and damaged broodcombs that are not readily used by the bees. Careful tiering of the supers will also help to reduce overcrowding. A plentiful water supply reduces swarming, as bees use a lot of water to cool the colony in hot weather.

—*C. ROFF, Adviser in Apiculture.*

Stock and Station

Beat Tetanus with Good Hygiene. Improved hygiene around sheep yards and shearing sheds will do much to reduce the toll of tetanus. This widespread disease is responsible for deaths ranging from a few sheep to several hundred.

Tetanus usually occurs after routine sheep work. At shearing, crutching, lamb marking, mulesing, and on dipping heavily grass-infested sheep, the animals can pick up tetanus germs. These germs often live for years in the soil around shearing sheds, dips, and sheep and horse yards. Infection takes place through wounds, especially deep ones. When it has gained entrance, the tetanus germ produces a poison that affects the nervous system. It is generally fatal.

Tetanus is very difficult to cure, so it's better to prevent it. Before shearing and crutching, the board should be scrubbed with disinfectant and the counting out pens cleaned. Lamb marking and mulesing tools should be dipped regularly in a disinfectant solution during these operations.

If tetanus occurs after lamb marking and mulesing, be warned and next time mark the lambs in temporary yards well away from the infected area. In any case, temporary lamb marking yards are an advantage. Besides being removed from the heaviest sources of infection, they allow you to drop the lambs on to clean grass after the operations.

Sheep can be inoculated to give them immunity from tetanus, and for all sheep, especially valuable rams and show stock, this may be worthwhile. Two injections 12 months apart will ensure life long protection.

—*A. T. BELL,*
Director of Sheep Husbandry.

Cost of Treating Sheep For Lice. Before tackling the job of treating sheep for lice, it is well for a sheepman to discover whether putting the sheep through is going to cost him more than it should.

As a case in point, some sheepmen dipping sheep with a power spray or plunge dip use dieldrin at a concentration of 0·05 per cent. Others use only a strength of 0.0125 per cent. Using the higher concentration at ½ gallon of dip to a sheep would cost over 1½d. for a sheep. Using the lighter concentration at half a gallon to a sheep would cost well under ½d. a sheep. Actually dieldrin at 0·0125 per cent. is quite strong enough to eradicate lice in sheep not long off shears.

For the man using the higher concentration, it would cost £6 13s. 4d. for 1,000; for the other man, £1 13s. 4d., which is just £5 more on every 1,000 sheep. Quite a difference, isn't it?

If you need help in deciding strength and quantity of insecticides, contact your local Sheep and Wool Adviser to help you work out the most economical way of treating your sheep for lice.

—*R. B. YOUNG*
Senior Adviser in Sheep and Wool.

Control Ticks in Spring. The cattle tick is a one host tick and you can gauge how prolific it is when you consider that a female will lay an average of 3,000 eggs when it drops from a beast. Now if you have a heavily infested animal dropping up to 200 ticks a day and you have 30 animals so infested, you will realise that those animals can infest your pastures at the rate of 18 million eggs a day.

The thing which helps to control tick population, one way or another, is the weather. Ticks like hot, humid and wet conditions, that is why they are so prolific in the summer months. On the other hand, cold conditions have an adverse effect on ticks and that is why we do not experience the same trouble from them in the winter months. Because of this adverse effect which cold has on tick propagation, it means that we enter the spring months of the year with a minimum of pasture infestation. So, if you control your ticks in the spring months of the year; that is, about September to December, dip them with an effective insecticide at least every three weeks, it means that you can take your cattle into the wet summer months of the year with minimum tick infestation abounding in the paddocks. This will lessen the number of dippings you will have to carry out in the wet months of the year when everything is against you and for the ticks.

—*S. G. KNOTT,*
Divisional Veterinary Officer

Feeding Beef Weaners. Beef weaners in Queensland need some extra feed during their first winter if they're to reach market weight at early age. The rate at which a calf grows during its first winter determines whether it can be marketed at two or three years.

Cattle that have native pasture as their only feed usually lose weight in the winter. Beef calves weaned onto blue grass or kangaroo grass lose weight and receive a setback.

They never catch up again, and this check can cause them to reach market a year late.

After May, the growth of calves on their mothers comes almost to a standstill. Cows suckling calves during the winter do not have a chance to regain body condition in preparation for the next calving.

Giving weaners supplementary feed in the winter will keep them growing. This practice also permits earlier weaning, which gives the breeders a chance to put on condition and have heavier calves.

Probably the simplest way of improving the feed for weaners is to reserve a special paddock for them. This may be the best paddock on the property, an area of improved pasture, a grazing crop or crop residue. If none of these can be arranged, a little conserved fodder is effective in preventing weight losses. Two to 3 lb. a head daily of good lucerne hay or three-quarters to 1 lb. of meal rich in protein are suitable materials. Cottonseed meal and peanut meal are well suited for this purpose. Meat-and-bone meal is also a satisfactory feed, but there may be some difficulty in getting the weaners to eat it. The feed should be taken to the cattle twice a week.

—*D. N. SUTHERLAND,*
Director of Cattle Husbandry.

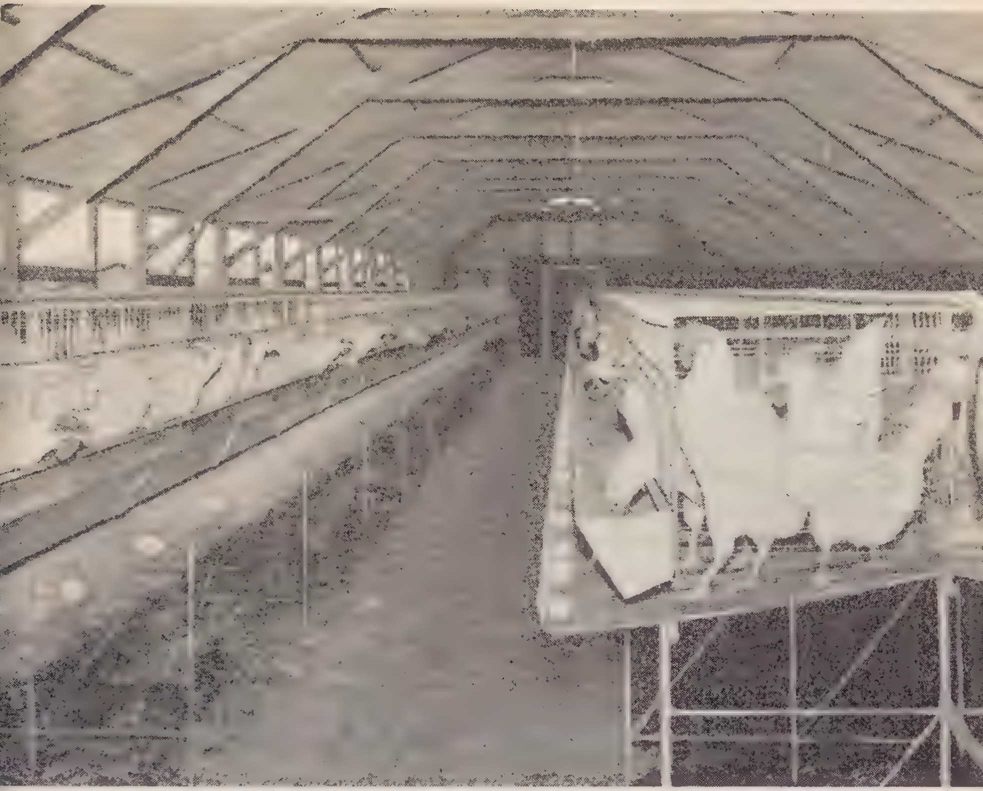


Plate 1: A Single Tier Cage System with Two Birds to a C

Keeping Hens In Laying Cages

By R. V. BYRNES,

Poultry Section.

Some people believe that housing layers in cages is a cruel practice. This argument can be dismissed in one sentence. Birds wouldn't maintain the high rate of production common in cages if the system was cruel.

Several years ago there were virtually no commercial cage farmers in Queensland. About this time manufacturers began to see a future in producing cages for the poultry industry. Once the early "teething troubles" were rectified, cages became more popular.

It is doubtful whether cages will ever supersede the intensive system of poultry farming, but they will have their place in the industry.

Laying cages are manufactured in 6 ft. units to hold eight birds in single cages or 12 birds in "two bird" cages and prices are usually quoted for a unit rather than for a cage.

Single Bird Cages

This cage, designed to accommodate one bird, is 9 in. wide, 18 in. deep, 21 in. high at the front and 18 in. high at the back.

Experiments have shown that higher production from each hen can be obtained from birds housed in single bird cages than in either "two bird" or colony cages. Perhaps this is because single bird cages eliminate bullying completely and allow slightly more "elbow room."

At present, this type of cage is not so popular as the "two bird" cage in Queensland, mainly because fewer birds can be housed to a shed, and the corresponding cost for each bird housed is increased. On the other hand, single cages have the following advantages—

(*a*) Production records can be kept for individual birds,

(*b*) Bullying and cannibalism are eliminated,

(*c*) Inexperienced farmers can cull accurately,

(*d*) Fly control is easier.

Two Bird Cages

The double or "two bird" cage is 3 in. wider than the single bird cage, but otherwise the dimensions are the same. They are favoured in Queensland at the present time because of the comparatively lower cost for each bird housed, that is including housing and cages complete. On present prices, the approximate cost would be 22s. for each bird in "two bird" cages and 36s. for each bird in single bird cages. In addition, "two bird" cages save time in feeding and egg collecting, as there are more birds in a given length of cages than with singles and consequently the distance walked is reduced.

However, "two bird" cages do have the following disadvantages when compared with single bird cages—

(*a*) Accurate individual production records cannot be kept,

(*b*) There is more bullying and cannibalism,

(*c*) Culling has to be done by visual means,

(*d*) Droppings don't dry out so quickly as with single bird cages, and fly control is more difficult.

Colony Cages

Colony cages are simply large wire-floored cages, 6 ft. long by 3 ft. wide designed to house 20 to 25 layers. They are not popular because of the following disadvantages—

(*a*) Individual production records cannot be kept,

(*b*) Bullying and cannibalism are very prevalent,

(*c*) Culling has to be done by visual means and is much less accurate than with double cages,

(*d*) Fly control is a problem, as droppings do not form cones and take longer to dry out.

The only points in favour of colony cages when compared with other types of cages are the slightly lower housing cost and labour requirement for each bird.

System of Cage Layout

The system chosen will depend on the attitude of the farmer. If he wants to get the greatest number of birds under the one roof, he may choose the multi-tiered system. On the other hand, he may consider that ease of operation in egg collecting, feeding and dropping disposal, is more important than number of birds housed and for this reason may favour a stepped system or a single tier system.

Generally cage systems can be classified into three main types—

(*a*) Single Tier Systems.
(*b*) Californian Offset or Stepped Tier Systems.
(*c*) Multi-tiered Systems.

The Single Tier System. This system consists of a single row of cages on either side of one or more aisles running the length of the shed. There are several suggested systems for the layout of a single tier system. One method used widely in America is to have two single rows of cages in a shed one on each side of a central aisle. The main advantage with a shed of this type is the ease of cleaning out droppings as this can be done from outside the shed.

On the other hand, construction costs may be cheaper with a multi-aisle shed and this may influence the farmer's decision.

With the single tier system, fewer birds can be housed to a shed than with either of the other cage systems, but it has important advantages. Operations such as egg collecting and feeding are much simplified as egg trays and feed troughs are each on one level at a convenient height (see Plate 1).

This reduces the amount of stooping and reaching by the person collecting eggs or feeding, and amounts to a considerable saving of time in a large cage plant.

The job of removing litter from a single tier cage plant is easier as there is more room to work under the cages. With birds housed in a single tier system, there is less danger of their being too close to the roof and being affected by heat radiating from the roof in hot weather. This can be a problem with multi-tiered and offset systems.

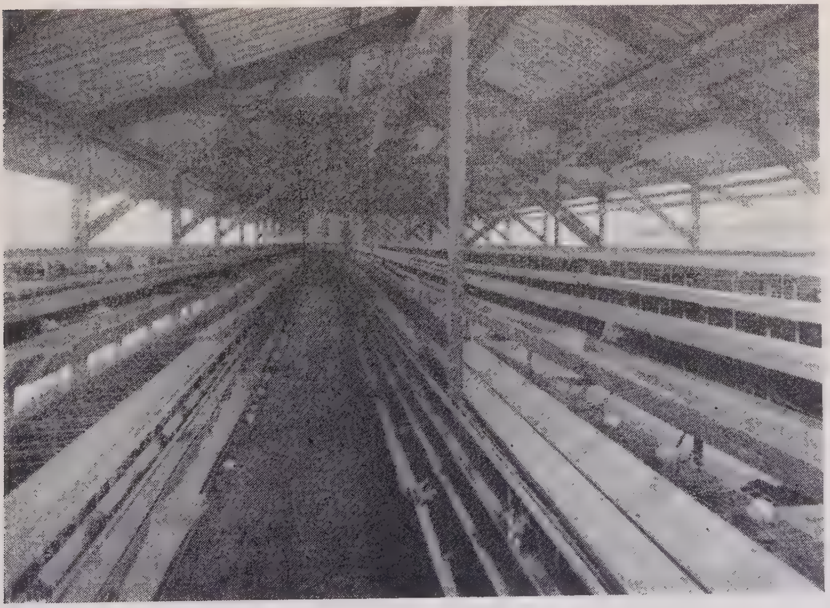


Plate 2

Interior of a Two Aisle Cage Shed, Showing One Aisle and Four Rows of Offset Cages. Note the individual production cards tacked to lengths of pine board.

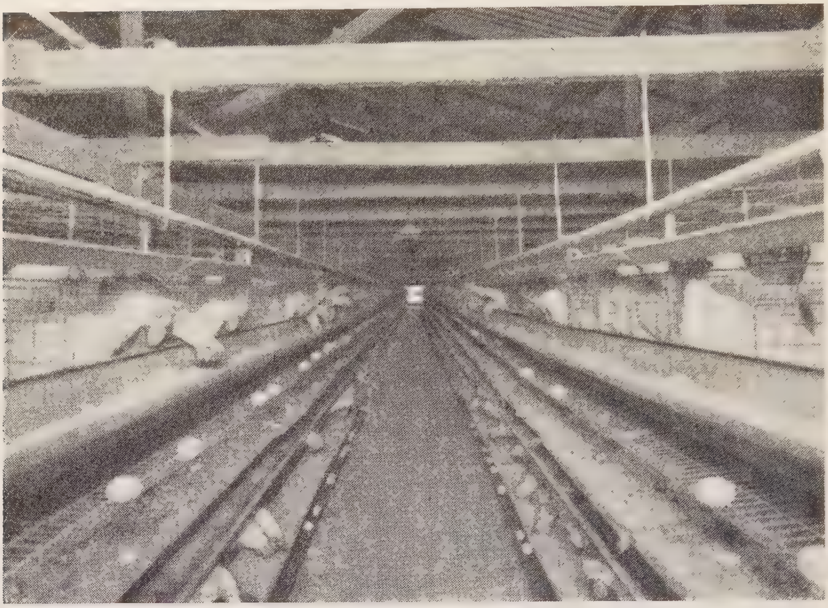


Plate 3

Four Rows of Multi-Tiered Cages on a Cage Farm at Mt. Cotton. In this instance, the cages are two tiers high.

It appears that single tier systems are gaining popularity in Queensland, as they have done in other countries, and they may well become the most popular system on cage farms within a short time.

Californian Offset or Stepped Tier System. This system consists of two rows of cages one offset above the other so that the front of the top row of cages is 4 in. behind the back of the lower cage. This allows droppings from the offset row of cages to fall clear of the lower row. This system is the most common one in use in Queensland at the present time, probably on account of the fact that more birds can be housed to a unit of shed area than with the single tier system while at the same time removal of droppings isn't the problem that it is with a multi-tiered system.

With two tiers of cages offset, neither can be placed at a convenient working height, hence a considerable amount of stooping and reaching is necessary during egg collecting and feeding. This will automatically increase the time required for these operations.

The usual layout is four offset rows of cages to a shed, two on either side of a central aisle. However, this can be varied, and with a wider shed, eight rows can be accommodated. Four offset rows are placed back to back in the centre of the shed with an aisle on either side and a further two offset rows on the outside of each aisle (see Plate 2).

Multi-tiered System. This system appeals to those farmers who consider that the number of birds housed to a shed is more important than ease of operation. As the name implies, the multi-tiered system is simply one or more rows of cages placed on top of one another (see Plate 3). It is necessary to make provision for collection and removal of droppings from other than the bottom row of cages. Dropping trays and wide revolving belts fitted with scrapers are two methods used and both of these have their disadvantages; dropping trays are awkward to handle and time consuming in cleaning. Belts are costly and deteriorate rapidly due to the destructive action of the droppings. Both dropping trays and belts have to be cleaned frequently as there is little room for droppings to build up under the cages.

Birds are affected more by heat in multi-tiered systems than in single tier systems as ventilation is better in the latter and heat radiation from the roof affects the birds less.

Site

Before choosing a site, make sure that the local authority permits poultry farming in the area. In addition, certain building regulations may apply to your district so make sure that you are conversant with them before you site your sheds.

To allow for future expansion, the smallest area of land required for a cage farm would be five acres. When choosing the site, bear in mind that it should be well drained with as little slope as possible in the direction in which you intend siting the long axis of the sheds. For this reason, land with a gentle easterly slope would be ideally suitable for a cage farm, provided that the site is accessible by road. A site such as this would be well drained and would receive the most effective sunlight for drying of droppings. The easterly aspect might ensure some protection against prevailing westerly winds in winter.

It is desirable that the long axis of the sheds run north to south to get the greater drying effect from sunlight on droppings on *both* sides of the sheds.

Layers in cages are particularly susceptible to cold prevailing winds, so it is necessary to provide wind breaks. If clearing is necessary it is a good idea to leave a belt of standing timber on the windward side of the site.

Housing

The ideal cage shed should allow maximum ventilation in summer, should have sufficient overhang to prevent rain blowing in on droppings, should protect birds from cold winds in winter and should be economical to construct.

Single or multi-aisle gable roofed sheds fit these conditions fairly well provided that at least 3 ft. of roof overhang is allowed and provision is made to protect the birds from cold winds in winter. If the sides of the shed are left open, it will be necessary to provide a windbreak on the windward side.

The length of the shed will be limited by the amount of level ground available on which to build it. If you extend a shed down a slope, a series of stepped levels will be necessary and pressure leaks may result in the watering system. The cost of construction of stepped levels will be high and it will probably be higher still if the whole site has to be levelled by excavation and filling.

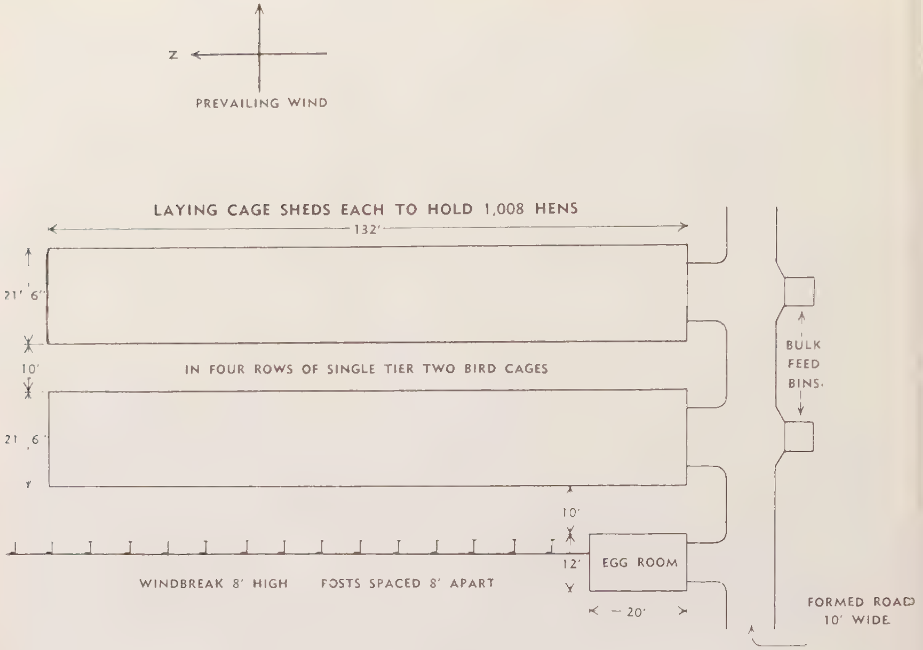

Z
PREVAILING WIND
LAYING CAGE SHEDS EACH TO HOLD 1,008 HENS
132'
21' 6"
10'
IN FOUR ROWS OF SINGLE TIER TWO BIRD CAGES
21' 6"
10'
12'
EGG ROOM
20'
WINDBREAK 8' HIGH
POSTS SPACED 8' APART
BULK FEED BINS.
FORMED ROAD 10' WIDE

Plate 4

A Suggested 2,000 Bird Cage Farm Layout.

The width of shed will depend on the number of rows of cages which you intend to put in it and the system of layout that you intend to use. Take for example a two aisle cage shed to house four rows of single tier cages. Two rows of cages are placed back to back in the centre of the shed, and a single row on the outside of each aisle. Each cage will be 2 ft. 3 in. wide (including egg tray) therefore the cages alone will take up 9 ft. of shed width. Each aisle should be 3 ft. wide. This will take up a further 6ft., giving a total width of 15 ft. Allowing 3 ft. of roof overhang and 3 in. for studs on either side, the overall width between eaves will be 21 ft. 6 in. Floors may be cemented and should be formed to give at least 12 in. in 100 ft. fall from end to end. The 12 in. in 100 ft. fall is necessary to keep the water in the drip trough flowing freely. Where insufficient fall is allowed, drip troughs often become clogged with deposits of mash, dust or feathers.

Adequate drains should be provided around each shed, with all drains leading into one or two larger drains serving the whole farm. The height of the side walls of the shed should not be less than 7 ft. otherwise the birds in the outside rows of cages may be affected by heat radiation from the roof. Allow approximately 3 ft. between the floor of the shed and the bottom of the cages to ensure that egg trays and feed troughs are at a convenient working height. This will allow plenty of room for cleaning out droppings (see Plate 5).

When siting the sheds, leave a space of at least 10ft. between eaves to allow air circulation, access of sunlight, and passage of vehicles during litter removal operations (see Plate 4 for a suggested cage farm layout).

Feeding

Although the feeding requirements for caged layers are similar to those for layers housed intensively, it must be remembered that under this system the birds are entirely dependant on the feed to supply all their requirements. A caged layers' all mash ration should contain a minimum of 15 per cent. protein, supplemented with adequate levels of vitamins A and D3, additional calcium and the trace element manganese sulphate. Low fibre mashes, that is, those containing less than 5 per cent. fibre should be used in cage plants as they tend to produce drier droppings than high fibre rations and so reduce the likelihood of a fly build up in the droppings. Excess salt in the ration is also a cause of over moist droppings so if this condition is noticed, steps should be taken to reduce the salt content immediately. Even though ground limestone or shell grit flour may be included in the ration, it is a good idea to give extra shell grit each week. This can be sprinkled on top of the mash or pellets.

Pelleted mashes are quite commonly used in cage plants, but owing to the bird's habit of picking up pellets in the beak and flicking them out of the feed trough, wastage with this type of feed may be greater than with an all-mash. On the other hand there is less fouling of the drinking trough by mash particles where pellets are used.

The metal feed troughs which are supplied with the cages have ½ in. lip on one or both sides to prevent birds' raking mash out with their beaks. However, this lip is effective only if the troughs are not filled more than two-thirds full and the birds are de-beaked.

In Queensland, "feeding up" on cage plants is usually done twice weekly. The feed is usually carried in a rubber-tyred push cart and ladled into the feed trough by means of a hand scoop. On cage farms in America, the use of battery-powered or engine-driven carts for feeding and egg collecting is common. To allow the person feeding up or collecting eggs to

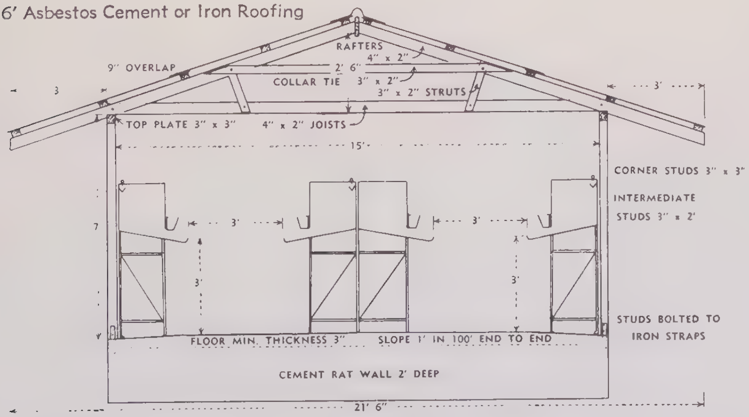

6' Asbestos Cement or Iron Roofing
RAFTERS
4" x 2"
9" OVERLAP
2' 6"
COLLAR TIE 3" x 2"
3" x 2" STRUTS
3
3'
TOP PLATE 3" x 3"
4" x 2" JOISTS
15'
CORNER STUDS 3" x 3"
INTERMEDIATE STUDS 3" x 2'
7
3'
3'
3'
3'
STUDS BOLTED TO IRON STRAPS
FLOOR MIN. THICKNESS 3"
SLOPE 1' IN 100' END TO END
CEMENT RAT WALL 2' DEEP
21' 6"

Plate 5

A Sectional View of One of the Cage Sheds Shown in Plate 4.

have both hands free, wooden or iron tracks or even grooves in the cement are used to guide the wheels of the cart.

Watering System

The most common type of watering system used in cages in Queensland is the nipple system. A ½ in. water pipe fitted with brass drinking nipples spaced at intervals to coincide with every second cage division is fixed to the front of the cage above the feed trough, or alternatively on top of the cage. Two cages are served by each nipple. Where single tier cages are placed back to back, one water pipe is placed between the two rows of cages so that it serves both rows.

As the nipples are inclined to leak, it is necessary to have a small V shaped drip trough fitted below the water pipe to stop water getting into feed troughs and spoiling mash, or onto droppings where it will favour a fly build-up. As mentioned in the section on housing, drip troughs should be given at least 12 in. fall in 100 ft., to prevent clogging. If a tap is provided at the end of each line of troughing, it can be used to fulfil a second purpose by enabling the birds to get extra water during a heat wave.

The supply of water to the nipples is regulated by a reservoir fitted with a float valve or by a pressure reducing device which is fitted directly to the water main. One reservoir should be provided at the end of each pipeline. The outlet to the pipeline should be fitted with a strainer to prevent foreign matter entering the line and clogging the nipples. A piece of clear plastic piping fitted vertically into an elbow at the end of the pipeline will indicate the level of the water in the reservoir and is an easy means of checking the water supply.

An alternative watering system is one whereby a continuous flow of water is run through a V shaped trough similar to the one mentioned previously. This ensures a continuous flow of cool water to the birds at all times.

[TO BE CONTINUED]

* * *

Painting Bore Tank

"M.K.", of Cunnamulla, has inquired about a suitable paint to apply to tanks which have previously been used to store bore water.

Answer: Any of the bituminous paints at present on the market would be satisfactory. It is essential that the tank be thoroughly dry before painting. If there is any sediment or caking in the tank, give the caked surfaces a thorough brushing with a wire brush to remove the sediment. Any holes that may be found will require patching. For this purpose, pieces of hessian thoroughly saturated with the paint will prove quite satisfactory.

To treat any hole, paint lightly around it and then apply the piece of saturated hessian to cover the area and then apply a liberal coat of paint. When the treated areas have been allowed to dry, paint the entire surface of the tank. It cannot be too strongly stressed that the success of the operation depends on having the tank clean and thoroughly dry before painting.

The Kensington Mango

By E. F. TREE, Adviser in Horticulture.

"An ever-green shade tree, which thrives in coastal Queensland on almost any type of soil. The fruit has a distinctive flavour which makes a fruit salad but the fibre is a nuisance. During the mango season, the crop is eaten by the neighbours' kids and flying foxes while the house cow mops up the fallen fruit."

That would be a fair description of the common mango but the Kensington mango is a different thing entirely. The Kensington mango is, literally, a beautiful fruit. When ripe, the skin shows a tinge of green, shading to a bright yellow with a blush of red where it has been exposed to the sun. A noticeable fleck in the skin together with the bright colour encourages some people to call it the "apple or strawberry mango" as distinct from the common variety. The flesh is free from fibre, thick, juicy and has a very rich flavour. It can be sliced from the seed and eaten with a spoon.

The actual origin of the Kensington mango is obscure. It was probably introduced by horse traders who were shipping remounts from Bowen to India. Commercial production of the variety began at Bowen and is credited to a Mr. Lott who named the variety after the property on which it was grown.

Propagation

Unlike many other varieties of mango, the Kensington breeds true from seed and this makes its propagation relatively simple. Three to six shoots develop from each seed and the accepted practice of pinching out all but the strongest shoot from each seed results in a very uniform line of trees.

Removal of the husk before planting the seed permits the kernel to be checked for weevil damage before planting and encourages the formation of a tap root in the seedbed. Fibrous root development will be improved if the tap root is cut some months before transplanting into the orchard.

However, it is better practice to plant the seeds in tins which are punctured at the bottom and lower sides and contain a few inches of coarse sand or gravel at the bottom. The tins are filled with a sandy loam and the seeds, dorsal side uppermost are pushed into the loose soil leaving the top exposed. A layer of partly decayed leaves or grass is used to top off the container. Frequent watering is necessary in dry weather to maintain growth in the seedlings.

The seed should be planted before the wet season, preferably in November. An occasional sprinkling of sulphate of ammonia around the edges of the tin will maintain the growth of the young trees.

Spacing and Pruning

Trees grown on a fertile soil will ultimately cover a large area but widely spaced trees give little return when young and, by the time they fill the spaces, much of the fruit is out of reach. A 35 x 35 ft. spacing is quite adequate on most of the lighter soils.

Early pruning should be restricted to pinching back the initial stem to form a head about

Plate 1

Mango Fruit Cluster. In the Dry Tropics, the Kensington bears heavy crops of large, highly-coloured fruit.

2½ ft. from the ground and then shortening back any branches which are over-vigorous.

Soil and Climate

Kensington mangoes are often planted on shallow, infertile soil. Although these conditions do not produce vigorous trees, the somewhat sparse foliage allows the sun to penetrate to the fruit and promotes early cropping. Early fruit with an attractive blush usually brings better prices than the larger, better-quality fruit harvested in mid-season.

It is not by chance that commercial production of Kensington mangoes is located in the Dry Tropics. Here 75 per cent. of the average annual rainfall of 40 in. falls in the first three months of the year. The hot dry period from August to December allows the crop to set and develop reasonably free from diseases which are troublesome in the wetter parts of the coastal belt.

Management

The alluvial soils of the Don and Burdekin rivers are well-drained clay loams. Water-bearing sands are normally encountered at a depth of 14-20 ft. below the surface. As the mango is known to be a deep-rooted tree, is is commonly believed that irrigation is unnecessary. This is quite wrong. The bulk of the feeding roots are located within 3 ft. of the surface and a marked response is obtained when the orchard is irrigated in July and again at three-week intervals after the crop has set.

Many young trees at Bowen show symptoms of nitrogen deficiency. Unless ample supplies of organic manure rich in nitrogen are available, sulphate of ammonia at a rate of 1 lb. per year—age of the tree should be applied in two dressings, half in December and the balance in March.

Bearing trees should receive a 4:12:12 or similar complete mixture, but the vigour of the tree should be taken into account in deciding the amount to use. Excess nitrogen will delay maturity of the fruit, induce vigorous leaf growth and prevent colour from developing in the skin.

Harvesting

The mango fruit has a caustic sap which causes discomfort to the pickers and blemishes the fruit. Washing the fruit in modern detergents, followed by a rinse in running water, quickly removes the congealed sap together with the natural bloom on the fruit.

Mature fruit which has not commenced to ripen is still firmly attached to the stalk and can be picked with the stalk attached. The fruit can later be de-stalked and placed stalk end downward in the shade to drain.

Prospects

Present production varies between 40,000 and 70,000 half-bushel cases, the bulk of which arrives on southern markets over a period of 6-8 weeks. The outlet has been broadened to some extent by the introduction of a private order trade which has gained ground in recent years.

Most people have to acquire a taste for tropical fruits and an increased demand for mangoes will depend on efforts made to introduce the fruit to new consumers. Better presentation on the market is urgently needed. Variable sized trays, strawboard liners and printed wraps instead of wood wool, and clean cases with attractive labels are all worth consideration.

The Kensington mango is a beautiful fruit; it should be efficiently handled, packed and presented to the consumer.

Brucellosis-Tested Swine Herds (As at 1st November, 1959)

Berkshire

Astbury, "Rangvilla", Pechey
Clarke, E. J., Mt. Alford, via Boonah
Cochrane, S., "Stanroy", Felton
Cook, F. R. J., Middle Creek, Pomona
Crawley, R. A., Rockthorpe, Linthorpe
Edwards, C. E., "Spring Valley" Stud, Kingaroy
Farm Home For Boys, Westbrook
Fletcher, A. C., "Myola" Stud, Jimbour
French, A., "Wilson Park", Pittsworth
H. M. State Farm, Numinbah
H. M. State Farm, "Palen" Stud, Palen Creek
Handley, J. L., "Meadow Vale", Lockyer
James, I. M. (Mrs.) "Kenmore" Stud, Cambooya
Kimber, E. R., Block 11, Mundubbera
Law, D. T., "Rossvill" Stud, Aspley
Lees, J. C., "Bridge View" Stud, Yandina
Ludwig & Sons, A. R., "Beau View" Stud, Beaudesert
O'Brien & Hichey, J., "Kildurham" Stud Jandowae East
Orange, L. P., "Hillview", Flagstone Creek
Pfrunder, P. L., Pozieres
Potter, A. J., "Woodlands", Inglewood
Puschmann, L., "Tayfield" Stud, Taylor
Q.A.H.S. & College, Lawes
Regional Experiment Station, Hermitage
Rosenberger, N., "Nevrose", Wyreema
Schellback, B. A., "Redvilla" Stud, Kingaroy
Smythe, E. F., "Grandmere" Stud, Manyung, Murgon
Stark, H. L., "Florinda" Stud, Kalbar
Thomas & Sons, F., "Rosevale" Stud, Laravale
Traves, G., "Wynwood" Stud, Oakey
Weier, V. F., "La Crescent", Clifton
Wolski, A., "Carramana", Warra
Young (Jnr)., W., Kybong, via Gympie

Large White

Assenbruck, C., Mundubbera
Barron Bros., "Chiltern Hill", Cooyar
Bell & Son, E. J., "Dorne", Chinchilla
Butcher, Dr. B. J. & Parnwell, A. J. Plunkett, via Tamborine
Clark, L. D., Greens Creek, Gympie
Duncan, C. P., "Hillview", Flagstone Creek
Fowler, S., "Kenstan", Pittsworth
Franke, H. J., "Delvue" Stud, Cawdor
Garrawin Stud Farm Pty. Ltd., 657 Sandgate Rd., Clayfield
Gibbons, A. E. H., Mt. Glorious
Gibson, H., "Thistleton" Stud, Maleny
H. M. State Farm, Numinbah
Hall, M., "Milena" Stud, D'Aguilar
Heading, J. A., "Highfields", Murgon
Horton, C. J., "Mannuem Brae" Stud, Mannuem, Kingaroy
Hutton, G., "Grajea" Stud, Cabarlah
Jensen, S., Rosevale, via Rosewood
Jones, K. B., "Cefn" Stud, Clifton
Kahler, J. & S., East Nanango
Kanowski, A., "Exton", Pechey
Kennard, R. B., "Collar" Stud, Warwick
Larsen, H. L., "Oakway" Stud, Kingaroy
Law, D. T., "Rossvill" Stud, Aspley
Lees, J. C., "Bridge View", Yandina
Lobegeiger, L. C., "Bremer Valley" Stud, Moorang, via Rosewood
Mack, A. J., Mundubbera
Palmer, A., "Remlap", Greenmount
Pampling, G., Watch Box Road, Goomeri
Postle, R., "Yaralla" Stud, Pittsworth
Powell, R. S., "Kybong", Gympie
Q.A.H.S. & College, Lawes
Radel, V. V., Coalstoun Lakes
Regional Experiment Station, Biloela
Robinson, O. R., & O. J., "Linvale", Argoon, Biloela
Skyring, G. I., "Bellwood" Stud, via Goomeri
Stanton, H. R., "Tansey" Stud, via Goomeri
Stewart, L., Mulgowie, via Laidley
Stumer, K. F., French's Creek, Boonah
Wharton, C. A., "Central Burnett" Stud, Gayndah
Wieland, L. C. & E., Lower Cressbrook, Toogoolawah
Zahnow, W., Rosevale, via Rosewood

Tamworth

Armstrong, H. J., "Alhambra", Crownthorpe, Murgon
Booth, J. D., Swan Creek, Warwick
Campbell, P. V., "Lawnhill" Stud, Lamington
Coller, R. H., Tallegalla, via Rosewood
Fletcher, A. C., "Myola" Stud, Jimbour
Herbst, L. "Hillbanside", Bahr Scrub, Beenleigh
Kajewski, W., "Glenroy" Stud, Glencoe
Kanowski, S. E., "Miecho", Pinelands
Potter, N. R., "Actonvale" Stud, Willcamp
Regional Experiment Station, Kairi
Salvation Army Training Home For Boys, "Canaan" Stud, Riverview
Skerman, D. F. L., "Waverley", Kaimkillenbun
Stephens, T., "Withcott" Stud, Helidon
Thomas & Sons, F., "Rosevale" Stud, Laravale
Wieland, L. C. & E., Lower Cressbrook, Toogoolawah

Wessex Saddleback

Ashwell, J., "Green Hill", Felton South
Cooper, G. J., Neumgua
Douglas, W., "Greylight" Stud, Goombungee
Dunlop, J. B., "Kunawyn", Acacia Road, Kuraby
Kruger & Sons, "Greyhurst" Stud, Goombungee
Law, D. T., "Rossvill" Stud, Aspley
Mack, A. J., Mundubbera
Scott, A., Wanstead Stud, Grantham
Smith, C. R., "Belton Park", Nara
"Wattledale" Stud, 432 Beenleigh Road, Sunnybank

Large Black

Pointon, E., Goomburra

Landrace

D. G. Grayson, Killarney

Orchard and Garden

Puffiness in the Tomato. Puffy fruit consigned to market can spoil your reputation as a tomato grower. It indicates an urgent need for better production methods with particular emphasis on the choice of varieties for planting and efficient irrigation.

Puffiness may be due to several causes, and is most troublesome during the winter months. Fruit with this defect is of inferior quality. Buyers do not like it and, on a competitive market, the pack sells at a discount.

Typically, the fruit is angular in shape, contains less than the normal number of seeds, is deficient in pulp, soft to the touch and light in weight. To a large extent, puffiness is associated with faulty pollination, which is aggravated by low temperatures at the time of flowering, and unbalanced nutrition.

Varieties differ in their ability to set and mature fruit during cool weather which is frequently encountered in plantings made during April and May in southern coastal Queensland. Grosse Lisse and its strains are, for example, less satisfactory at this time of the year than cluster varieties such as Potentate and Salads Special. If, however, you don't like cluster tomatoes, try Ace—a globe variety which has performed reasonably well in the winter crop and produces an attractive line of fruit.

No matter what variety you grow, watch your fertilizer programme. Heavily fertilized winter crops are very subject to puffiness in the harvested fruit. Reducing the amount of applied nitrogen and increasing the amount of applied superphosphate tends to reduce losses.

Finally, check your irrigation programmes. Puffiness can be induced by either too much or too little water. Only sufficient water is needed to keep the crop growing steadily from transplanting to harvesting.

—V. N. MEURANT,
Redlands Experiment Station.

Weed Control in Bananas. It's difficult enough, goodness knows, to keep weeds down in small crops planted on fairly even ground. But at least you can cultivate when the weather's suitable, and even handweed to get some measure of control. On the sloping, uneven difficult ground often planted to bananas, however, the problem of seasonal weed growth is a big one which needs careful and prompt attention.

There should be *two* main objectives—

(1) To prevent the weeds going to seed and so reduce future populations.
(2) At the same time to provide a soil cover to prevent runoff and erosion and protect the soil surface.

You can periodically brush down the weeds before they flower by using a sickle or slash-hook. The brushed weeds will form a good protective soil mulch.

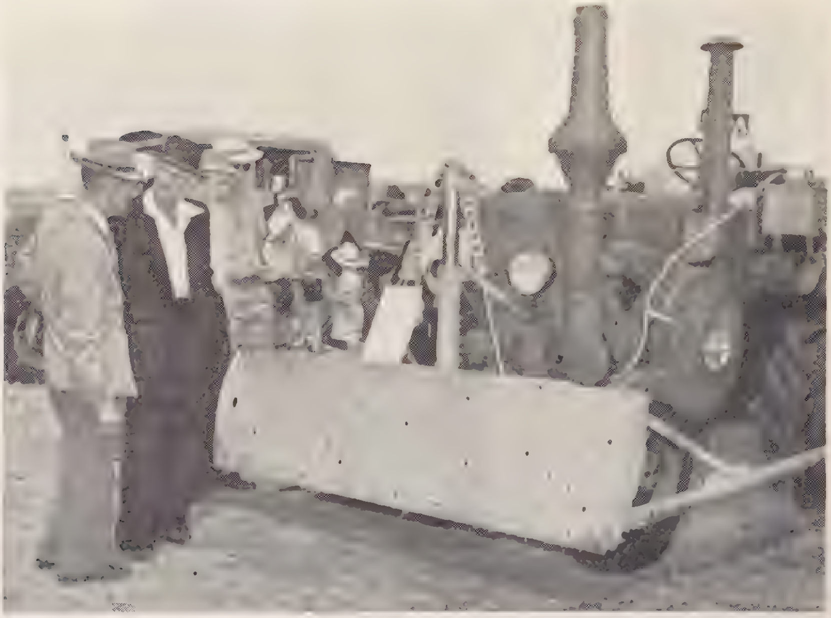
Any remaining weeds can be rapidly killed with arsenical sprays. Do not, in any circumstances, use hormone sprays. Most of these are harmful to bananas.

You can't afford to neglect weeds among bananas of any age and particularly in very young stands.

Once let the weeds get the upper hand in a young plantation, and lack of sunlight—plus competition for moisture and food—will quickly set them back.

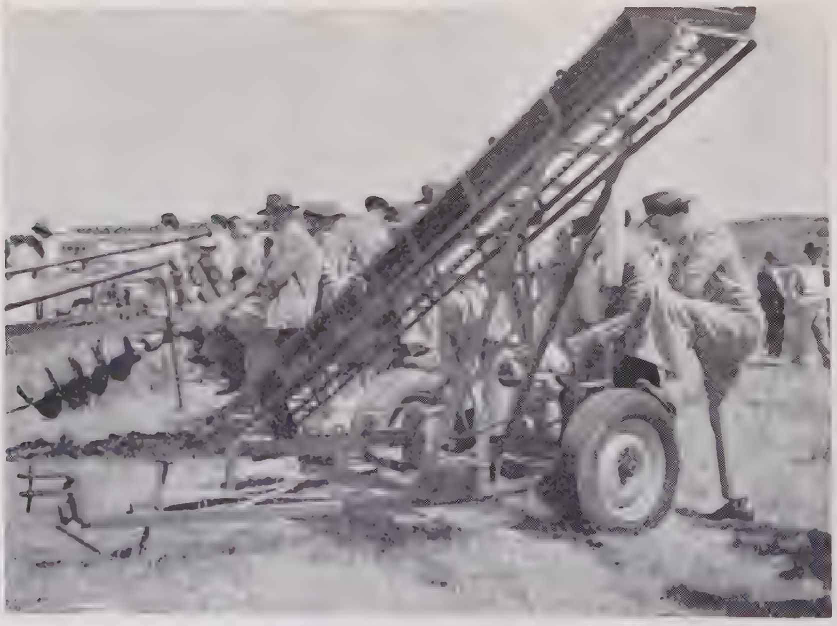
—D. DOWDLES,
Adviser in Horticulture.

Home-made Dozer Blade



Blade on "Bulldog" Tractor Equipped with Hydraulic Control. This Was Made by Mr. N. J. Rosenberger, of Wyreema, and Exhibited at the Toowoomba Farmers' Festival.

Mobile Bag Loader



A Mobile Bag Loading Elevator Made from Disused Truck Elevator, Front Wheels and Axle from Scrapped Motor Car, and a Spray Trailer Made from Chassis, Axle, Springs and Wheels from Scrapped Motor Truck. Mr. R. F. Hudson, of Southbrook, was the Maker.

For Country Cooks

Notes from the JUDITH MAY TEST KITCHEN, directed by RUBY BORROWDALE for the Butter Marketing Board.

Though very fruity, this cake has a light texture; its colour is rich. It cuts into neat, even slices.

Christmas in the Kitchen

The Christmas tradition is so strong and the sentiment so beautiful that anything less than the age-old customs would verge on sacrilege. Let us then try to embody the true spirit of Christmas in our parties for the Festive season; let's have candles, snowflakes, holly, reindeer, sleighs, Christmas trees, Santa Claus and Christmas bells and let us have the good, old, seasonal recipes, even if we modify those same recipes to suit our climatic conditions. The basic ingredients can be the same as those used by our ancestors in older countries but a touch of Queensland can be introduced to help our native-born people feel that they too can still enter into the spirit of the old-style Christmas feast time.

RICH CHRISTMAS CAKE: 12 oz. (¾ lb.) butter, 12 oz. (¾ lb.) brown sugar, 8 eggs, 1 lb. plain flour, ½ teaspoon baking soda, ½ teaspoon salt, 1 tablespoon mixed spice, 1 lb. seeded raisins, 1 lb. cleaned currants, ½ lb. sultanas, ¼ lb. mixed sliced peel, 4 oz. glace cherries, 2 oz. blanched and chopped almonds, 1 tablespoon treacle, ¼ cup rum, brandy or sherry (optional).

Note: If a very dark-coloured cake is preferred add 1 tablespoon Parisian essence (caramel colouring).

Prepare cake pan, 9 in. by 3¼ in., by lining with three layers of unglazed brown paper and brush the paper that will be next to the cake with melted butter. If making up half the quantities, use a 7 in. round cake pan.

Sift the plain flour, soda, salt and spice. Blanch and chop the almonds and add them to the flour mixture—this keeps them crisp. Place the raisins, currants, sultanas and mixed peel in a basin, slice the cherries and add them; stir to blend evenly then pour over the brandy, rum or sherry. Orange juice can be used in place of the spirits.

Beat butter and sugar to a cream and if making a dark cake add the Parisian essence while creaming the butter and sugar.

Add each egg separately and beat until mixture is thick and fluffy. If eggs are added too quickly, the mixture will curdle.

Blend in the treacle. Add the sifted dry ingredients and beat quickly till smooth. Lastly blend in the prepared fruits and stir with wooden spoon until evenly distributed. Pack into prepared pan. Bake in moderate to slow oven for about 4 hours. If making up just half the quantities, about 2½ hours baking will be sufficient.

Cool cake in the pan on a rack and do not remove paper wrappings until ready to ice or cut.

A rich fruit cake should be wrapped and stored from 2 to 3 weeks before icing and decorating for Christmas. The cake is usually covered with almond paste about ½-inch thick. When the paste is set, cover the cake with royal icing. Decorate after the icing is set.

★ ★ ★ ★

Your Christmas cake will be greatly improved in flavour and will cut into neater slices if you pour a little brandy or rum over the top, then lift the wrapping paper carefully from the bottom and add more brandy, and do the same to the sides, replacing the original wrappings as neatly as possible. Allow about 4 tablespoons brandy or rum for a large cake. Wrap the cake securely in two layers of greaseproof paper or one layer of aluminium foil and store in a sealed cake tin until ready to ice.

★ ★ ★ ★

SHORTBREAD: 4 oz. butter, 6 oz. plain flour and 2 oz. fine castor sugar. Sift the flour into a bowl and add the butter (which should be softened to room temperature). Rub the butter in finely. Add the sugar and knead thoroughly with the hands until the mixture binds together. Turn on to a board (do not dust the board with extra flour, it would make the shortbread hard and dry), and knead lightly. Press into a round cake about 7 in. in diameter then lift on to a buttered scone tray, prick well and crimp up the edges, using finger and thumb. Bake in a slow oven until firm and a pale straw colour, do not over-cook. As soon as taken from the oven, mark into sections and dust with castor sugar while still hot.

Ayrshire Shortbread is made by beating 1 egg yolk into the sugar before adding to the butter and flour.

CHRISTMAS PUDDING: 4 oz. (¼ lb.) butter, 1 cup brown sugar, 1 teaspoon Parisian essence (caramel colouring), 3 eggs, grated rind 1 orange or lemon, 1 medium-size apple (chopped or grated), few drops almond essence, ½ teaspoon vanilla essence, 6 oz. plain flour, ½ teaspoon baking soda, 1 teaspoon mixed spice, ½ teaspoon salt, 1 cup soft white breadcrumbs, 1½ lb. mixed dried fruits, 2 oz. blanched and chopped almonds, ½ cup milk to mix with a good dash of rum or brandy if you like the flavour.

Note: Have ready washed some lucky coins and Christmas trinkets to add during the final stirring.

Sift the flour, soda, salt and spice together; add chopped almonds. Cream butter, sugar and colouring well; then beat in the eggs, one at a time. Beat well. Blend in the flavourings, orange rind and chopped apple. Stir in the breadcrumbs. Add flour mixture alternately with milk and beat smooth. Blend in the fruits.

Three-quarters fill a large buttered pudding basin (use aluminium or enamel for quicker cooking), or use two small ones, cover closely with buttered paper or aluminium foil.

Steam for about 5 hours. Remove cover and allow pudding to cool in the basin standing on a cake cooler. Re-cover and store in refrigerator until ready to re-heat at serving time. Serve with brandy butter and pouring cream.

BRANDY BUTTER (Hard Sauce): Cream together 2 oz. fresh butter (the unsalted kind if you have it), and 1 oz. castor sugar. Beat until very light-coloured and creamy. Then stir in 1 oz. ground almonds (almond meal). Keep the "butter" in a cool place until just before serving then add 1 dessertspoon of sweet sherry and 1 teaspoon brandy, blending them in a little at a time. Pack into a dainty glass dish and mark into small squares. Place 1 small square on each serving of pudding and allow it to melt slowly. Serve with thin pouring cream or a brandy-flavoured custard sauce.

FRUIT MINCEMEAT (for little Christmas mince pies, patties or turnovers): 2 large cooking apples (cut into quarters and cores removed, but do not peel), ½ lb. seeded raisins, ½ lb. currants, the juice ½ lemon and the grated rind 1 lemon, 2 tablespoons sugar, 1 teaspoon mixed spice, 1 tablespoon treacle, 2 oz. softened butter and ¼ cup rum or brandy (optional), blanched and chopped almonds to taste if you wish. Put the apples, raisins and currants through the mincing machine using the large cutter; place all ingredients in a bowl and stir well. If the fruit mince is not to be used immediately, pack it into a screw top jar and store in refrigerator. Use as required.

Hand Washing of Woollen Garments

By M. D. RICHARDS, Assistant Wool Technologist

THE first essential in washing woollen garments is an ample supply of softened water. A number of country bores conveniently supply it. By soft, we mean that it does not contain calcium or magnesium salts. These salts combine with the ordinary soaps to form insoluble metallic soaps which float on the water as a scum.

If a garment is immersed in water having this scum, it will absorb some into the weave and hinder effective washing. The scum is often the cause of white woollens becoming yellow.

Should your water supply be hard, there are proprietary water softening agents on the market which can be used with safety.

Pick a Good Soap

The type of soap is another important item; only good quality mild soaps should be used. These are usually sold in flake form. Quite a number of detergents are available; these can be used with confidence in place of soaps.

Squeeze lukewarm, soapy water through the garment for several minutes. Then rinse it in two changes of clear, lukewarm, soft water.

Remove excess water by squeezing the garment in a towel. Avoid wringing and twisting. Dry knitted garments by laying them flat on a towel in the shade and not in strong sunlight.

Requirements of a club secretary

By J. PARK,
State Organiser,
Junior Farmers' Organisation

It may be appropriate to introduce this very important section with the oft-recorded "Secretary's Lament." Those readers who have suffered at the hands of an inexperienced or incompetent secretary will probably endorse some of the sentiments expressed, while the efficient secretaries, past and present, will simply accept the "leg-pull" in the same manner as they have accepted all such jibes since the first secretary recorded the first minutes on a slab of stone thousands of years ago.

> "If the secretary writes a letter it's too long.
>
> If he sends a telegram it's too short.
>
> If he sends out notices he's a spendthrift. If he doesn't he's lazy.
>
> If he attends a committee meeting he's butting in.
>
> If he stays away he's a shirker.
>
> If he offers a suggestion he's a know all.
>
> If he says nothing he's a useless nincompoop.
>
> If the attendance at a meeting is poor he should have whipped in a few more members.
>
> If he goes round whipping in members he's a nuisance.
>
> If he asks a member for his fees, he's insulting.
>
> If he doesn't, he's falling down on the job.
>
> If the function is a success, the committee takes the praise, but if it is a failure the secretary gets the blame.
>
> If he asks for advice he's incompetent.
>
> If he doesn't he's got a swelled head.
>
> If he dies he was the best secretary they ever had.
>
> If he lives they will go on grumbling about him until he does die."

The secretary has a key role to play in almost every activity, and if he (or she) is doing his job he will be in the centre of things. If he is a good secretary he will like being in everything, like making arrangements, and like to keep things tidy and in order. This liking must be genuine and enduring because the position of secretary is no easy one and is a very responsible one. No one expects the secretary to do everything himself, indeed it is most desirable that he should not, but the responsibility for getting things done will usually fall on his shoulders.

Must Be Reliable

Reliability is the quality most needed and sought after in a secretary, because we must be able to feel confident that when a job has been placed in the secretary's hands it will be done promptly and well. This feeling of confidence will do much to preserve peace and create unity in the club. Not only must the secretary be good at doing things but he must be good at getting other people to do things. This will call for tact and a knowledge of the capabilities, real and apparent, of the other members.

The secretary acts as the connecting link between all sections of the club, and between the club and the community. Within the club it is his job to make sure that everyone knows what is going on, and what is planned to take place. So much confusion and discontent results when members are not told anything, and most frequently this is the secretary's fault. Full reports and announcements made at meetings; circulars, letters and notice-of-meeting-cards sent through the post, and messages given personally or over the phone are means of assuring that the rank and file members, as well as the members of the executive committee, are as it were, "kept in the picture."

Club Notice Board

Letters, circulars, newsletters and other papers addressed to the secretary are usually intended for the information of all the members. The secretary must, therefore, make known to the members the contents of these communications before or during the meeting. Letters and circulars are read aloud at the meeting, newsletters are distributed with the notice-of-meeeting cards, and any illustrated brochures or similar material can be pinned up on the club notice board. (Incidentally it is most desirable that the club should have a notice board.)

While it is most important that news coming into the club should be made known to the members promptly and effectively, it is equally important that news of the club's activities should be made known to those outside it. Copies of the club's minutes and reports of activities are required to be sent each month to the State Organiser; reports of all items of interest to the press and radio should be sent off as soon as possible. Naturally the reporter or the assistant secretary will compile these reports and make sure that they are despatched, but it is the secretary's responsibility to see that these officers are doing their job.

◆

Farmers' Questions

"K.D.", of Charleville, has inquired about the growing of carob bean trees.

Answer: The carob bean originated in the Mediterranean region where it is grown extensively for its sweet pods.

Under favourable conditions, the carob will grow into a small spreading tree about 25 ft. high. It is a slow-growing plant but can live to lengthy periods, some trees are still productive when over 100 years old. Most carob trees will not produce any quantity of seed until 7 years old.

"R.O.", of Morayfield has inquired about the selection of a variety of potatoes for his district.

Answer: Probably the most suitable variety of potatoes to grow in the coastal areas of southern Queensland is Sebago. Sebago produces a high proportion of marketable tubers and yields well. It possesses resistance to Irish blight and is not prone to make second growth.

Native Pasture as Silage Can Be Made to Pay

By J. F. KENNEDY, Officer in Charge, National Cattle Breeding Station, Belmont, and T. G. GRAHAM, Agrostologist, Queensland Department of Agriculture and Stock

From experience over two summers, it is considered that the conservation of native pasture as silage is practical and highly economic.

The beef cattle industry in tropical Queensland, both breeding and fattening, is confined mainly to a belt of country approximately 100 miles wide, from Rockhampton north along the coast-line to the Northern Territory border.

Annual rainfall of this belt ranges from 20 in. in the inland sections to over 100 in. in the north-east section. The distribution of the rainfall is typically tropical, the wet season occurring from November to March. In the more southern and western parts, winter rainfall, although of low reliability, may be of importance.

Native pasturage is restricted to summer-growing grass species but in the inland a wide range of useful herbaceous types can result from effective winter rains. The rate of growth of grasses in the summer months is extremely rapid, maturity being reached by March-April. Normally there is no growth during the winter, but providing sufficient rain is received, fresh growth can be expected from August-September onwards.

The effect of this pattern of pasture growth on the growth and development of cattle is striking. Rate of growth is satisfactory through December to March. Stock then either lose weight or less frequently remain static until the August-November period when if rain falls they will regain lost weight or increase at a slow rate. If no winter rains fall, rate of growth and production fall even lower during this third quarter.

All classes of stock are affected by this annual variation in useful pasturage, weaners probably suffering the most serious check.

This annual fluctuation of pasture quality is of direct concern not only to producers but presents problems also to meet marketing organisations, beef production becoming a seasonal undertaking.

Obviously, supplementary feeding is one answer to this variation in production but for various reasons, mainly economic, no systematic attempt is made throughout this whole region to provide supplements in the lean periods of a normal year or even to consider hand-feeding in a drought year. To date little attention has been given to the clear-cut problem of conserving feed from flush periods to carry over the lean ones. The failure to tackle this question is more difficult to understand when the staggering drought mortalities are considered. In the 11 years, 1944-55, the number of cattle lost in Queensland through drought was 4·5 million (Queensland Government Statistician).

BELMONT TRIALS

Conditions for making grass silage existed on the National Cattle Breeding Station, "Belmont," near Rockhampton, where agricultural officers of the State Department of Agriculture are consulted in an advisory capacity in matters concerning forage production.

Partly because of the lack of information on the conservation of grass silage, and partly because of the unique value of the experimental stock on Belmont, it was decided to investigate the practicability and economics of conserving native pasture as it is rarely possible to purchase the more orthodox conserved fodders for less than £25 to £35 a ton. Considerable experience has now been gained in the conservation of native pasture as silage and hay, although so far only silage has been fed to cattle.

Material conserved — In the the initial work, no great effort was made to select high quality pastures but rather to investigate the mechanics of the whole operation. The selected area normally carried poplar gum, bloodwood, and some ironbark. The soil was a light sandy loam and grassed mainly with bunch spear (*Heteropogon contortus*), red Natal (*Rhynchelytrum repens*), forest blue (*Bothriochloa intermedia*), and kangaroo grasses (*Themeda* spp.); less dominant were several *Panicum* spp. and *Chloris* spp. Of the herbs the most common were *Glycine* spp. and several *Sidas*.

In order that the harvested fodder should be as free as possible from dry material from the previous season's growth, the area was burned in mid-November, 1956. Good rains amounting to 11 inches were received during December, but the early part of January, 1957, was hot and dry and by that time the earlier maturing species—particularly red Natal grass—were in full flower. Cutting commenced immediately and at this stage bunch spear grass had commenced to flower while Queensland blue grass was still in the vegetative state.

Equipment—The equipment used consisted of a Ferguson tractor with a 6 ft. mower and a Massey Harris twinetying engine-functioned pick-up baler towed by either a tractor or a Land Rover. The baler was adjusted to deliver bales 2 ft. in length. It was not necessary to rake the cut material since the baler was able to lift a complete swath. Bales were pressed as tightly as the tying mechanism of the machine would permit and weighed 55 lb. green.

Method of Ensiling—The baled material was ensiled in a pit of dimensions 50 ft. x 10 ft. x 9 ft., the far end sloping back 2 ft. in 9 ft. while the near end was graded at 1 in 3.

It was clear early in the operations that, if bale temperatures were to be kept to a safe minimum, it would be necessary to cart in and pack into the pit with a minimum of delay. Temperature of bales lying in the paddock for one hour would rise to 105 deg. F.

The pattern of bale packing in the pit called for some care. Not only had there to be a minimum of air space but the removal of the bales as silage had to be facilitated. To this end, the first layer was packed 5 bales wide the length of the pit, the second layer was edged forward half a bale on the bottom layer, the third layer edged forward a further half bale and so on.

Bales were packed with ties running across the pit and all spaces between bales or at the ends were packed tightly with loose, fresh-cut material. In order to press out as much air as possible, after the first two layers and after every subsequent layer the ensiled material was rolled with a heavy crawler tractor.

By constant attention to rolling, the temperature of the bales could be reduced from 120 deg. F. to the safer level of 105 deg. F.

Although a wheel tractor has been recommended for rolling it was found to be most unsatisfactory. The 4-ton crawler tractor did a satisfactory job although some twine ties were broken. The pit was filled with the top layer 1 ft. above ground level and sealed with 2 ft. of rolled soil (Plate 1).

Yield—The yield of the 1957 crop was at the very low level of 35 cwt. green fodder to the acre, but on this occasion no great attention was devoted to either yield or composition. The same area in January, 1958, yielded 3·27 tons of green material to the acre while a selected area of 20 acres of forest blue grass in March, 1958, yielded 5·6 tons to the acre of a fodder vastly superior to that harvested in 1957.

Costs—It was possible to assess costs fairly reliably in 1957 since the baler was hired at the rate of 1s. 6d. per bale plus twine and fuel.

Plate 1

Sealed Trench with Harvested Area in Background.

Including this figure with others the final "into pit" cost was £6 17s. per ton. By virtue of the increased yield in 1958 cost was reduced to £3 17s. per ton, while on the selected area cost was assessed at £2 18s. per ton.

Method of Feeding Out—Near drought conditions prevailed in August, 1957, and the pit was opened, sufficient soil being bulldozed off to expose about two days' feed requirements. The aroma of the silage was excellent and the regular pattern made it possible to remove the bales with a minimum of effort, the binder twine ties being unrotted and strong (Plate 2).

Wastage, in the form of mouldy bales, was estimated at 10 per cent., most of the spoilage occurring at the sides where bales were in contact with soil. It was possible for one man to load a lorry backed into the the pit with one ton of silage and feed out in troughs in two and a half hours.

The Agricultural Chemist of the State Department analysed samples of the silage at the time of feeding out. The results are as follows:

TABLE 1

COMPOSITION OF PASTURE SILAGE MADE AT BELMONT

—	As Removed from Pit	On Moisture-Free Basis
	%	%
Moisture ..	67·9	..
Protein	2·27	7·1
Fibre	11·89	37·0
Ash	2·66	8·3
CaO	0·47	1·47
PrOr	0·24	0·74

Plate 2

Baled Silage Being Opened Up after 6 months in Trench at Belmont.

Temporary troughs were constructed with 6 in. x 1 in. rough hardwood and steel fencing pickets. Two lines of pickets were driven into the ground, the lines being 2 ft. apart. Two sets of 6 in. x 1 in. hardwood were wired to the pickets at ground level, thus creating a shallow trough.

To prevent the animals stepping into the trough and fouling it, a rail of 6 in. x 1 in. hardwood was wired to the pickets at a height of 18 in., the cattle feeding over the top of this.

Opposite pairs of pickets were wired together at the top to prevent spreading.

The allowance of feeding footage for each animal was 2 ft.

The 44 ft. of troughing was erected by two men in a half day, and in due course all material was demolished undamaged in one hour (Plate 3).

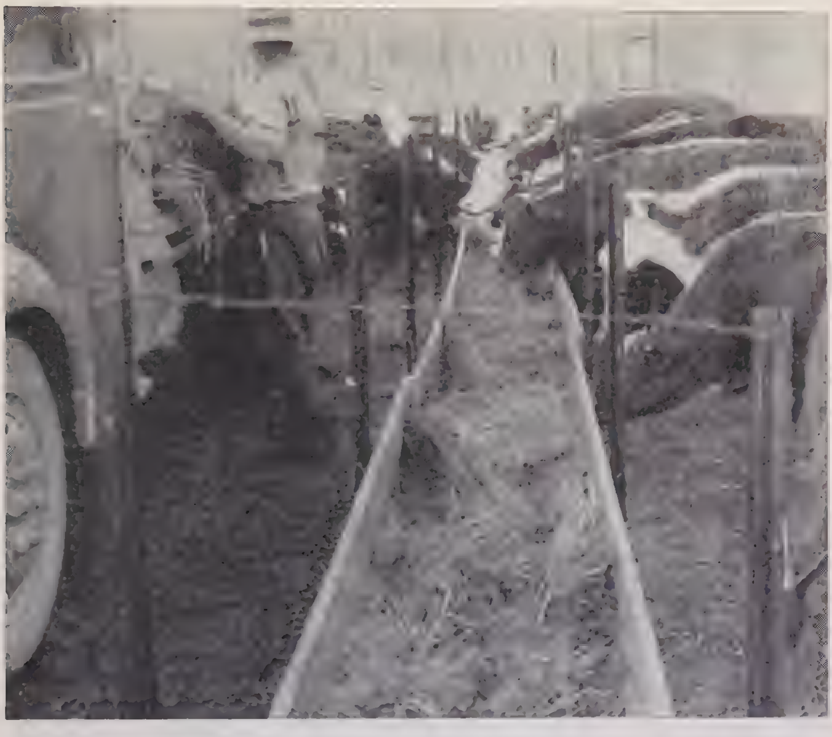


Plate 3

Showing Simply Constructed Feeding Trough Described in Text.

The palatability of the silage was obviously high and all species were readily consumed. It was striking to observe the attraction of several herbaceous species, including *Sida* spp., which as a component of pasture is not grazed at all. *Glycine* spp. as silage was particularly attractive and stock sought it out from the mixture.

Performance of Stock Fed—220 eight-month-old mixed weaners constituted the trial herd. They were run in an 80-acre paddock containing very little grass, which was completely dry and very fibrous (Plate 4). The herd had not been hand-fed before, and were introduced to the silage immediately they were weaned. The initial ration was 10 lb. a head which was later increased to 15 lb. a head. The overall mean bodyweight at the commencement of feeding was 350 lb., and after the first month the figure had risen to 362 lb.

This was the first occasion at Belmont on which weaners gained weight during the first month off their mothers, although on all other occasions good native pasturage was available to them. The silage proved palatable to all but two or three weaners, the "shy feeders" usually associated with drought or supplementary feeding not being so evident.

What Is The Verdict?

From field experience over two summers, it is considered that the conservation of native pasture as silage is practical and highly economic. Wet weather during operations is not a serious bar as it is in haymaking, the full programme being continued on a day upon which 120 points of rain fell; the material was handled by the baler rather better when wet with rain.

Baled silage, although requiring rather more labour than most private owners have available, possesses the enormous advantage over other forms of silage, when being fed to the larger numbers of beef herds, of ease in feeding out.

Plate 4

General View of Feeding in August, 1957. Note that grass is eaten out around feeding area. Animals which are obviously not weaners are cows put in as coaches (8 in all).

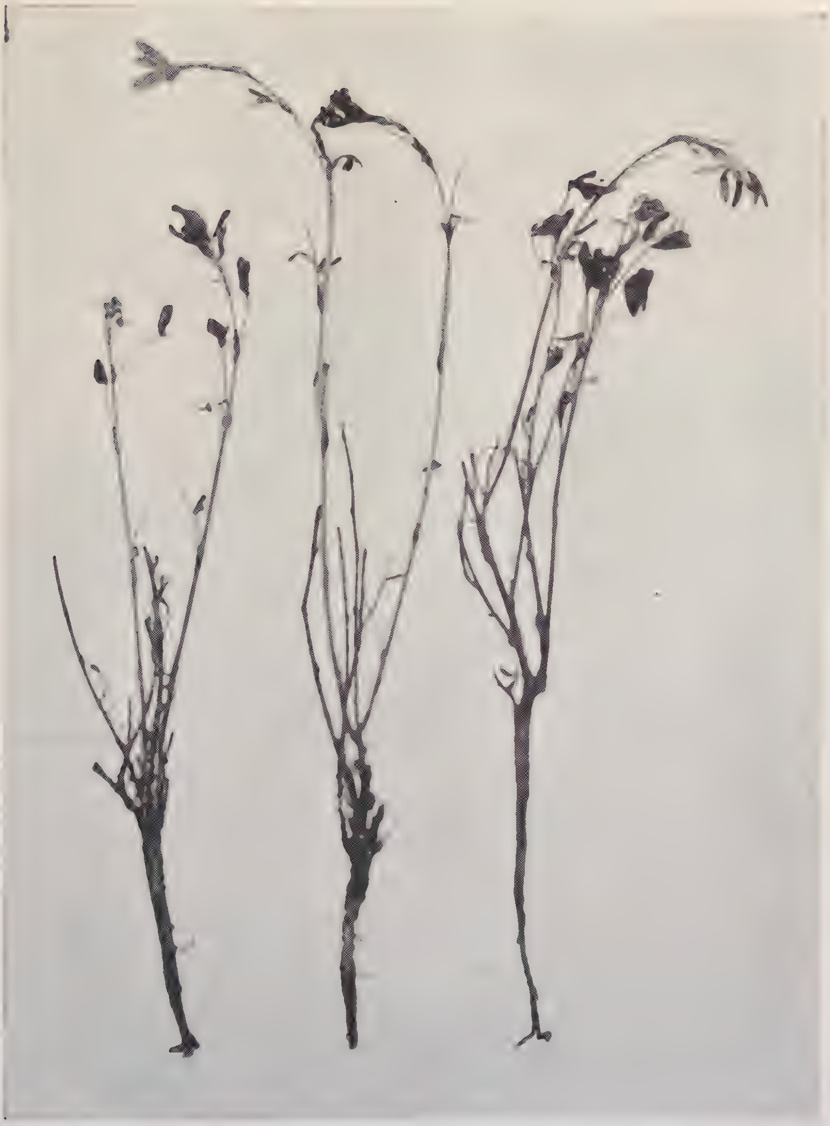


Plate 1

Root Rot Affected Plants Showing Decay of the Tap Roots.

Root Rot of Lucerne

By G. S. PURSS, Pathologist.

The symptoms, some characteristics, and the control of root rot of lucerne, are discussed:

Root rot of lucerne commonly causes a premature thinning out of plants, often leading to a considerable shortening of the economic life of the stand. The disease, known

Seasonal Greetings are extended to all our readers and to those who have helped and co-operated with the work of the Department during 1959

to be caused by two closely related fungi (*Phytophthora cryptogea* and *Phytophthora parasitica*), has been reported from a number of areas in Queensland. It has been recorded only in the last few years, although it has probably been present for a long time. It also occurs in America.

Symptoms

Lucerne plants affected by root rot may at first show little evidence of disease. There may be slight wilting of some shoots and yellowing of the leaves. Plants removed from the soil in the early stages of infection show a light-brown discoloured area on the tap root up to 1 in. in length and situated from 2 to 5 in. below the surface of the soil. Internally this discoloured area extends up to half an inch in advance of the external discoloration. As the disease progresses, the bottom portion of the root system rots away leaving only the upper stub of the tap root which is often covered by a mat of fungal growth (Plate 1). At this stage, the plants are usually badly wilted and yellow. Lateral roots, although often affected, do not seem so subject to attack as the main tap root.

Root rot may cause complete loss of plants in patches where conditions are particularly conducive to the disease (Plate 2), but more usually plants scattered throughout the paddock are affected resulting in a gradual reduction of the effective stand (Plate 3). Some plants are able to survive attack by the development of lateral roots near the surface of the soil. Such plants are, however, subject to moisture stresses in dry spells and are easily pulled out during renovation operations.

Generally plants less than a year old are more subject to attack but plants much older than this have been affected.

Factors Affecting Its Severity

Like most diseases caused by this type of fungus, wet soil conditions are important in the development and spread of root rot. It is commonly found on the lower sections of a paddock during periods of high rainfall.

Water flowing over the soil surface plays an important part in the spread of the root rot. In Plate 4, the disease can be seen following the path where free water had recently flowed. Again it often occurs after periods of light flooding. In irrigated stands, it is common to find root rot affected plants at the bottom end of bays where drainage is likely to be impeded.

Soil type has a very great bearing on the severity of the disease. It has usually been associated with areas of heavy soil, which possess an impervious clay layer near the surface. Such soils stay wet for long periods. Root rot often starts on the tap root at the top of the impervious layer a few inches below the surface. While lucerne can be grown successfully on this type of soil during drier years, the advent of excessively wet weather usually results in heavy losses in the stand.

When lucerne is planted immediately after a defective stand has been ploughed in, root rot often follows. This can be explained by a build-up in the soil of the organism that causes the disease.

Control

This type of disease is always difficult to control. The provision of adequate surface drainage helps to minimize damage. Where irrigation is practised it should be carried out carefully to avoid prolonged over-wetting of the soil.

On soils with impervious layers close to the surface, the growing of lucerne will always remain a calculated risk. Growers must be prepared to have relatively short-lived stands on such soils.

Replanting of lucerne after a thin stand has been ploughed in should be avoided.

Plate 2

Root Rot Killing Lucerne over a Large Area.

Plate 3

Scattered Plants Dying Out in a Lucerne Stand Affected with Root Rot.

Plate 4

Root Rot in Lucerne Following the Path Traced by Free Water.

Pasture and Crop

Eliminate Gaps in Cotton Row. An uneven stand of cotton can mean reduced returns. The cotton plant can adjust itself to small differences in plant population but it can't compensate for large gaps in the rows. Poor seedbed preparation, low seeding rates, and insect attack are some of the causes of gappy stands. Most of these conditions can be controlled by the grower.

It's easier to thin out a heavy stand than build up a poor one. Filling in the gaps is rarely successful as the latecomers can't catch up with the original planting.

The size of seed may vary with the variety and some seeds carry more fuzz than others. It's a good idea to adjust the planting rate accordingly.

On well-prepared soils, a planting rate of 10 lb. to the acre may be suitable but 15 lb. to the acre is advisable as a general rule.

—W. G. STEELE,
Senior Adviser in Agriculture.

Making the Best Use of Rain. Rain is worth so much to us that we must make the best possible use of it, when it falls.

For the stockowner, this means using contour cultivation practices to overcome surface packing and to increase intake, maybe pasture furrows to hold the rain till it can sink in, and grazing practices which retain at least a thin cover on the ground surface to keep the sun off the soil and to absorb the force of the falling raindrops.

It means using perennial fodder crops wherever possible for these are able to make better use of scattered falls of rain than can be made by annual crops.

For the crop grower, it means the use of contour farming practices combined with a mixed farming rotation which relieves the soil of the exhausting effects of annual cultivation.

Our restricted rainfall is too precious—any rain allowed to run to waste might just be that little bit extra which makes the difference between profit and loss.

—J. L. GROOM, Senior Agronomist.

Grazing Care by Irrigated Pastures. Grazing at the correct stage of growth will help you get the best out of irrigated pastures. If resting periods between grazings are too short, the pasture will be overgrazed. Depletion of the stand and lower yields are almost certain to follow.

There's a most suitable time to harvest every crop. Care should be taken to manage pasture as carefully as you'd manage any other crop.

Pastures in flush growth can be grazed every three weeks. But in periods of slow growth, intervals of four to six weeks between grazings may be necessary. Grazing no shorter than three to four inches encourages grass growth; closer grazing stimulates clover growth and leads to clover dominance. Regulate the interval between grazings and the length of the pasture remaining after grazing to meet the seasonal growth rate of all the species in the sward.

—A. NAGLE, Irrigationist.

Cannibalism and Feather-Eating in Poultry

By P. D. RANBY, Veterinary Officer
and H. W. BURTON, Poultry Adviser

Forms of cannibalism in poultry are outlined and their possible remedies described.

Cannibalism and feather-eating are vices that are fairly common in Queensland poultry flocks. In some cases most of the chickens in the flock have a cannibalistic tendency, in which case attacks are frequent and deaths many. At other times a few individuals start attacks but the exposed flesh attracts other members of the flock. The habit may thus spread.

With recent trends in the industry towards intensified methods of housing and the use of high protein-energy diets, an increase in cannibalism can be expected.

Forms of Cannibalism

The more common forms of cannibalism are as follow:—

(1) *Feather-Eating*

Feather-eating is quite prevalent in some flocks, including laying fowls. The denuded backs of laying birds may become reddened by sunburn if they are running in the open. In chickens, feather-eating may lead to cannibalism (see Plate 1).

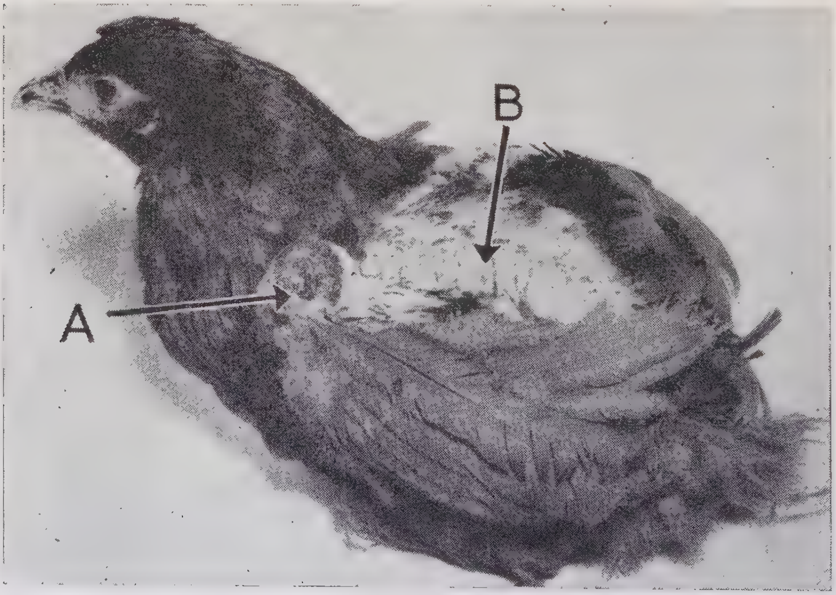


Plate 1

This Australorp Chicken has been the Victim of Feather-Eating and Cannibalism. Its back is featherless (arrow B) and there is a large, granulating wound on the "elbow" of its wing (arrow A). This is a fairly common form of cannibalism and probably started as a result of feather-eating.

In ducklings, attacks of feather-eating tend to be more brutal than in fowls. Ducklings driven by the craving will persistently pursue their flock-mates.

(2) *Toe-Pecking*

Toe-pecking is usually seen only in young chickens. It often occurs when baby chickens are not fed until as late as the third or fourth day after hatching. Delayed feeding is not uncommon where newly hatched chickens are transported long distances or where their dispatch from the hatchery has been delayed.

(3) *Wing and Tail Pecking*

The larger feathers on the wing and tail are "juicier" and may invite attention from chickens with cannibalistic tendencies. When the feather follicles are exposed, the flesh is attacked in turn. The elbow joint of the wing is a favourite spot. Large, raw wounds penetrating to the wing-bones often result, as seen in Plate 1.

(4) *"Rips" in Colony Cages*

Chickens reared in colony cages are often "ripped" by the claws of other chickens that scramble over their backs (see Plate 2). The claws of such birds reared on wire-mesh floors become long and sharp. "Rips" become more prevalent in chickens over, say, 7 weeks old, especially if the cage is overcrowded. On one poultry farm at Aspley this year, 9 out of 250 cockerel chickens, 7 weeks old, that were housed in two colony cages, were found to be severely ripped.

Such "rips" invite pecks from nearby chickens, which then deepen the wounds.

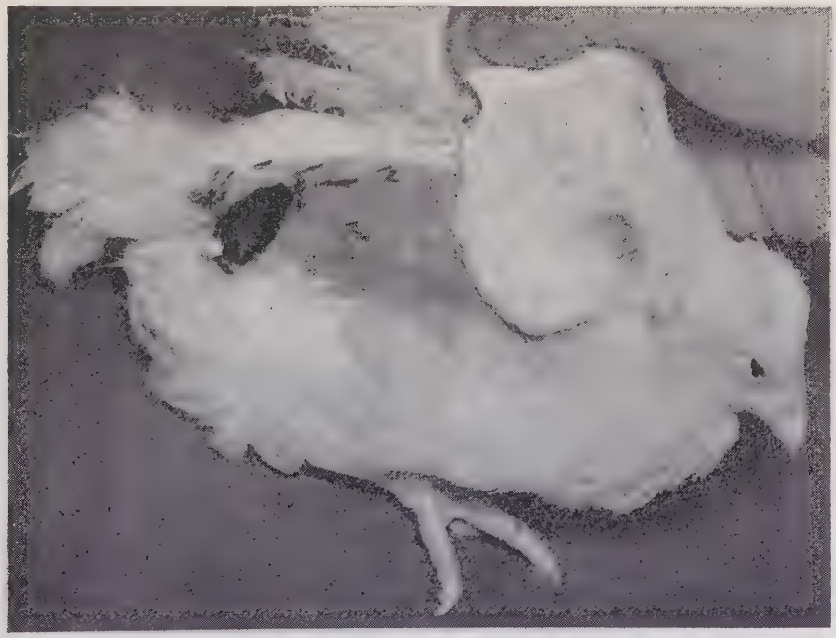


Plate 2

An Example of a "Rip" in a Cross-Bred Chicken from a Colony Cage. This wound has been made by the sharp claws of another chicken as it scrambled over its back. Note the two claw marks on the skin just above the "rip". Such wounds are pecked at by the other chickens although this particular case has been little attacked as yet.

(5) *Vent-Pecking and "Pick-Outs"*

Vent-pecking and "pick-outs" are the usual forms of cannibalism in adult fowls but may also occur in younger birds. Victims are constantly worried by attacks from other birds or become "pick-outs" in which case they are disembowelled.

Vent-pecking often starts in the vicinity of laying nests, particularly if the nests are rather exposed to light. Having laid an egg, the hen momentarily everts the end of the oviduct (egg-tube), which is then pecked at by a nearby hen. Some hens even develop the habit of waiting for their would-be victims to lay their eggs.

A Costly Vice

Death-losses from cannibalism are probably greater than many poultry farmers realise. Where records are kept, deaths of about 4 per cent. can be expected in ground-reared chickens and higher in colony cages. Similar deaths may occur in laying fowls.

"Explosive" outbreaks occasionally occur among young chickens which may literally peck each other to death. A reduction to half the chicken flock has been observed in extreme cases.

In the case of feather-eating, bare-back hens tend to bring a lower price for meat purposes at the end of the laying season.

Multiple Causes?

There is no single cause of cannibalism and feather-eating. The vice is more prevalent under certain conditions. White Leghorns and their crosses show a somewhat greater tendency to cannibalism than the heavy breeds. Overcrowding, boredom, hot, humid conditions and unbalanced diets all play a role. The vice is probably more prevalent where high protein diets are fed.

On one farm seen in the Rockhampton area, almost all of the laying fowls were completely bare-backed, while half-grown chickens adjacent to them were engaging in both feather-eating and cannibalism. The intensive pens were overcrowded, the ventilation poor and the roof low, with the result that hot, humid conditions prevailed. These vices continued despite the feeding of fair-quality lucerne chaff and milk products.

It has long been known that some fibre in the ration tends to avert cannibalism and the feeding of oats or a similar fibrous foodstuff has been recommended. More recently overseas, the addition of the aminoacid methionine to the diet has been found to prevent cannibalism. This work suggested that a lack of methionine could cause the vice.

In the case of feather-eating, the addition to the diet of good leafy lucerne chaff and liver meal has often been very beneficial, suggesting that group B vitmains may be involved.

Debeaking Is Effective Control

Cannibalism can be considerably reduced or even prevented by debeaking. In this operation, the end of the upper beak is removed. To be effective, debeaking must be done properly. Remember, debeaking not only combats cannibalism, but also reduces wastage of mash from the trough. Its value is thus twofold.

Two methods of debeaking are available, as follows:

1. *Electrical or "Hot" Debeaking*

This method requires the use of a special electric debeaker. Cost of the apparatus (price at 1-10-59) is £17. A number of the larger poultry farms have installed them.

The upper beak is cut through at a distance of one third to half the distance from the tip towards the nostrils. The blood vessels are quickly sealed by the heat of the blade. The beak grows only slightly after the operation, as shown in Plate 3. Birds of any age may be done, but the operation is most conveniently carried out from 1 to 3 weeks of age.

Chickens may be debeaked by this method at the rate of about 300 an hour. They do not show any ill effects and will start eating within minutes after being debeaked.

2. *Mechanical or "Cold" Debeaking*

This method requires only a pair of nail secateurs, short scissors or similar instrument to cut through the upper beak as described. It is

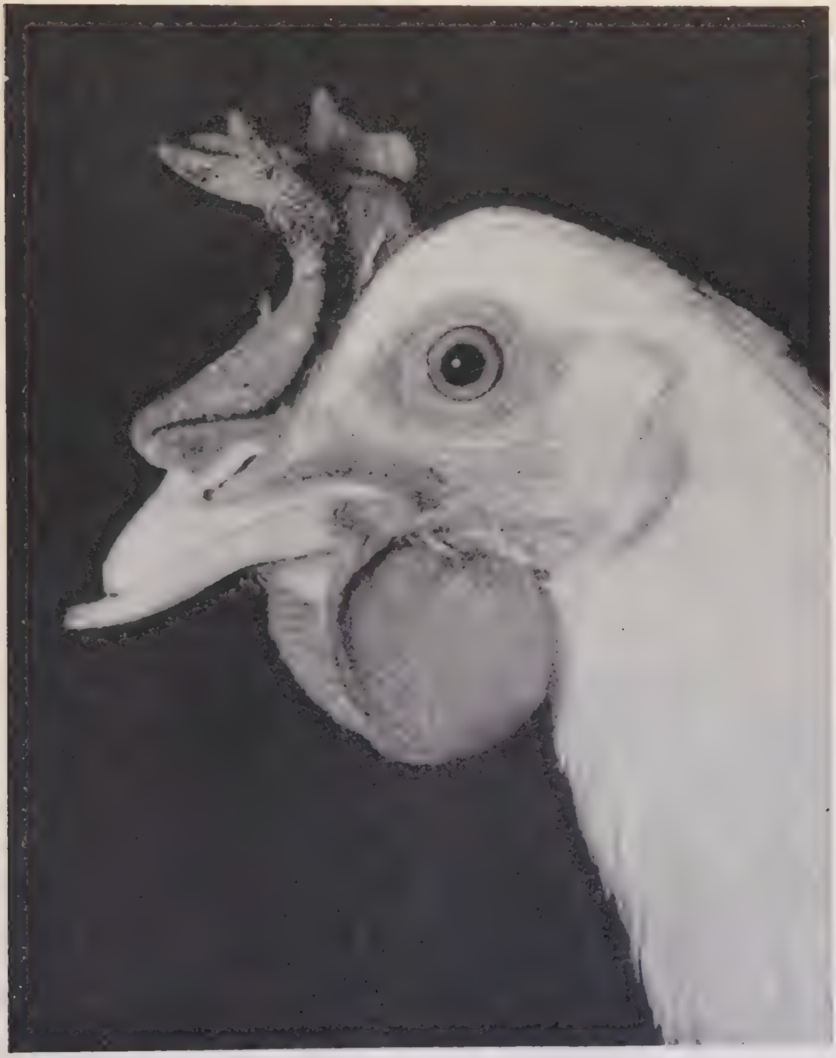


Plate 3

A debeaked W.L. Laying Pullet from the Animal Husbandry Research Farm (Poultry Section), Rocklea. This bird was debeaked by an electrical debeaker when one week old.

faster than the electrical method. However, the method should only be applied to chickens one or two days old. In the case of older chickens, there is always a risk of excessive bleeding. Death rates of 10 to 15 per cent. have been encountered when chickens 3 to 6 weeks old have been mechanically debeaked. Deaths continued for about one hour after these flocks were debeaked.

Several large broiler farms in the Brisbane area successfully debeaked day-old cross-bred chickens mechanically. Even where day-old chickens are done, it is wise to include a vitamin K rich foodstuff in the breeder's ration. This is to ensure that the blood of their chicks clots quickly after the beak is severed. Livermeal and lucerne are rich in this vitamin.

Beak-Tipping

"Tipping" of the beak refers to the mechanical removal of the bloodless portion of the end of the beak. The line of demarcation can be seen with the eye, at about one quarter of the distance from the tip towards the nostrils. "Tipping" may be convenient as an emergency measure where cannibalism has broken out and an electrical debeaker is not available. However, its value is only temporary as the beak grows to full size again in about a month.

Removing the Centre Toe

Where "rips" are troublesome in colony cages, portion of the centre toe may be removed with the electrical debeaker about one-tenth of an inch above the toe-nail. This operation may be carried out at the same time as debeaking.

Other Control Measures

1. Avoid overcrowding.

2. Ensure ample ventilation.

3. Remove any cannibalised birds and place them separately.

4. Ensure a balanced diet. Where cannibalism or feather-eating is prevalent, add 4 per cent. livermeal and 4 or 5 per cent. good quality lucerne chaff or meal to the diet if these are not already present. Wongbok may be used as an alternative to lucerne. Increase the common salt to 1 per cent. of the mash. Add a small proportion of crushed oats.

5. Place all nests above floor level and keep them fairly dark. These measures should reduce vent-pecking of hens that have just laid.

6. It is wise to debeak pullet chickens intended later for laying cages and also, any birds that are to be housed intensively.

7. Don't delay in feeding newly hatched chickens beyond two days or toe-pecking may result.

◆

MILLET FEEDING FOR CHICKENS: *The birdseed grain, white French millet has shown distinct promise of being a suitable food for chickens from day-old onwards. Agriculture Department officers describe the results of a pilot trial just completed at the poultry section of the Rocklea Animal Husbandry Research Farm as "very encouraging." If further tests support millet's initial promise, use of millet instead of wheat will reduce the grain cost in rearing chickens by up to 25 per cent. Chickens fed a ration containing millet as the grain portion weighed 26·6 oz. at eight weeks. Chickens fed a ration based on wheat as the grain weighed 28·3 oz. Although the wheat-fed group was slightly heavier than the millet-fed group at eight weeks, conversion of food into liveweight was slightly better with millet.*

100 Years of Queensland Dairying—IV

When Milk Was ½d. a Gallon

By E. B. RICE, Director, Division of Dairying

The first condensed milk factory was established in Queensland in 1904 and there were six condenseries in 1908. Records indicate that some earlier butter factories had equipment and made small quantities of condensed milk. A condensed milk factory at Toogoolawah continued operations until 1930, but condensed milk has not since then been produced in this State.

The South Coast Co-operative Dairy Company, Southport, made roller process skim-milk powder in 1947. Pauls Milk and Ice Cream Company, Brisbane, commenced to manufacture spray-process skim-milk powder in 1953.

A factory considered to be the most modern in design and equipment in the southern hemisphere erected by Nestles at Gympie commenced to manufacture spray-process wholemilk powder in 1955. By 1958, the number of factories which had equipment for roller drying of buttermilk was 10. The powder is sold mainly for stock feeding purposes, but two factories manufacture buttermilk powder which is sold for use in various food industries.

Farmers' Returns

In 1892, the prices paid to suppliers to a factory at Lanefield fluctuated from ½d. to 4d. for a gallon of milk. The Maleny factory which was opened in December, 1904, paid farmers 3½d. a lb. for cream of 40 per cent. fat test, with slight differentials for cream of higher or lower test. From 1900 to 1914 the price paid to farmers for cream supplies was about 9d. a lb. commercial butter and then from 1915 to 1930 the price was fairly constant from 1s. 1½d. to 1s. 3d., though in some years it rose to 1s. 5d. and in 1920 to 1s. 10d. During the depression years from 1933 to 1936 it fell as low as 8½d. During 1938 to 1942 it was fairly stable at about 1s. 2d.

The outbreak of war in 1939 marked the beginning of changes in relation to marketing and prices of dairy products. The Commonwealth and British Governments entered into a contract for the sale to Britain from November, 1939, of the exportable surplus of Australian butter and cheese. An equalisation price of 72s. 6d. a cwt. received by butter factories during 1939-40 was the highest received for 10 years, and the average payout to suppliers to butter factories for cream was 1s. 1½d. a lb. commercial butter.

In 1942, a Dairy Industry Assistance Act was passed by the Commonwealth Government under which subsidies were paid for the first time, commencing on October 1, 1942. In 1942-43 the Commonwealth contributed £604,433 as subsidy and the average payout to suppliers to butter factories in Queensland was 1s. 4d. a lb. commercial butter. The subsidy was altered from April 1, 1944, to provide a higher differential of 2d. a lb. commercial butter as an incentive for farmers to increase cream production in the eight non-flush season months. This system continued to June 30, 1946, after which the subsidy reverted to a flat monthly rate.

By 1945-46, the payouts to butter factory suppliers had risen to 1s. 8d. a lb. commercial butter.

In 1946-47, a Joint Industry Investigation Committee appointed by the Commonwealth Government ascertained the cost of farm production based on 1,050 random-chosen farms in Australia, including 375 in Queensland. Of the total, costs of 692 farms were finally taken to determine the average cost of production, which was estimated to be 1s. 7½d. a lb. commercial butter.

In 1947, the Commonwealth Government agreed to a five years guaranteed price scheme. All suppliers of milk or cream for manufactured dairy products were guaranteed a price equivalent to 2s. a lb. commercial butter from April 1, 1947, and the price was to be reviewed annually according to movement in cost factors. Returns to farmers rose steadily from 2s. 1½d. in 1948 to 3s. 6d. a lb. commercial butter in 1951-52.

In 1952, a new five years guaranted prices scheme was approved. Variations from the previous scheme were that it was limited to efficient cost of production for supplies of milk and cream for butter or cheese manufacture, the subsidy would be a fixed amount determined each year and the guaranteed price related only to butter and cheese consumed within Australia, plus not more than one-fifth thereof. For 1952-53 the price of efficient production was fixed at 4s. 1.29d. a lb. commercial butter, but due to exports exceeding one-fifth of Australian domestic consumption, farmers' prices averaged 3s. 11d. a lb. commercial butter.

Price control and rationing of dairy produce was abolished in Britain on May 8, 1954, after 15 years of such controls.

Average payouts per lb. commercial butter to Queensland suppliers reached the highest level of 4s. 1d. in 1953-54, declining to 3s. 9d. in 1956-57 and in July, 1958, due to a sharp decline in butter prices on a heavily oversupplied British market, the interim equalised price was 3s. 1d. However, realisations in London soon improved and the average payout to farmers for 1957-58 was 3s. 7½d. a lb. commercial butter.

The Commonwealth's stabilization scheme was renewed for five years from July 1, 1957, only minor changes being made to the conditions provided in the preceding scheme.

Acknowledgments: In the preparation of this article the writer has obtained information from various reports and data in the Division of Dairying, the annual reports of the Department, "Dairying in Australia," published by the *Queenslander* in 1902, and the report of the Committee appointed in 1923 by the Queensland Council of Agriculture to examine the position of the dairy industry. His own knowledge of developments over the past 25 years has also been included.

[CONCLUDED]

Bucket and Bail

Tower Coolers for Cream. For an outlay of about £30, a handy dairy farmer can build himself a tower cooler for cream. Use of this cooler will help him keep his cream quality up to choice grade.

A tower cooler is a good substitute for a refrigerator. Their low cost should put tower coolers within the reach of all. Plans of a tower cooling layout are available from district dairy advisers.

In the tower method of cooling cream, cool water from a concrete pit in the separator room is circulated through a tubular cream cooler. The water is then pumped to the top of a 9 ft. wooden, box-like tower, and is dropped down, over baffles, to the bottom of the tower. As it falls, the water is cooled by evaporation. The cooled water is ready for re-circulation through the cream cooler.

—*A. O. EVANS, Dairy Adviser.*

Identifying Heifer Calves. Know your heifer calves and you'll put your herd improvement plan on a sound footing. When your heifers come into the maternity paddock, mistaken identity can set your plan back by years.

Progressive farmers now use a breeding plan based on production records. For its success, you must be able to identify your heifers. A heifer calf identification service is given to the 1,100 Queensland farmers who are production-recording their herds. It's part of herd recording and there's no extra charge for it. In this scheme, identifying numbers and letters are tattooed in a calf's ears, and information on its breeding and age are recorded and filed away.

Farmers who are not members of herd-recording groups should have some method of calf identification. They could tattoo identifying marks in their calves' ears and keep a record sheet.

—*S. E. PEGG,*
Chief Herd Recording Adviser.

Get the Best Out of Your Separator. Unless your dairy separator is in perfect mechanical condition, you can expect losses in both butterfat and cream grades. As well as this, a separator that's not properly maintained can be extremely dangerous.

The bowl nut should be replaced at the first sign of wear in the threads. If the threads on this part become worn, the nut can be forced off the spindle and the bowl will blow up.

Check the mounting occasionally to make sure that it's dead level. A faulty mounting causes vibration that re-mixes the butterfat and skim milk, increasing fat losses. See that the separator is driven at the correct speed, that the bowl is not slipping and that the engine or electric motor is turning at the manufacturer's rated speed. Occasionally adjust the bowl height following the directions in the instruction manual.

—*J. D. ELRINGTON,*
Senior Dairy Machinery Adviser.

Are You Losing Production? Some farmers stimulate milk let-down in their cows by washing and massaging of the udder. Others do not seem to worry so much about it and pay little attention to it. Ruakura in New Zealand have carried out some interesting work on stimulation. Identical twins were used and no washing was compared with 30 seconds of stimulation before putting on the cups. They found that there was a difference of 16 per cent. production in favour of stimulation.

These experiments were later repeated and a 30 per cent. difference in fat production was obtained.

—*"Recording Notes."*

Check Milking Machine Efficiency. Milking machines on many Queensland farms need overhauling. A high incidence of mechanical faults in milking machines has been brought to notice by district Dairy Officers who test the machines as part of their duties.

Of the 881 milking machines tested last year, only 8 per cent. were free from all faults. But many of the faults were minor and could be corrected on the farms. Major faults were excessively worn vacuum pumps which were detected in 34 per cent. of the machines, and faulty pulsators which were found in nearly half of the machines.

Major faults in milking machines slow down the rate of milking and possibly increase the amount of udder troubles in a herd. Regular checks on milking machine efficiency will detect faults before they become serious.

—*J. D. ELRINGTON,*
Senior Dairy Machinery Adviser.

Plan Now For January

Repair roofs and tanks to catch all available rainwater for cleaning operations.

Destroy flies and breeding grounds and protect milk quality.

Keep all dairy equipment clean and sterile.

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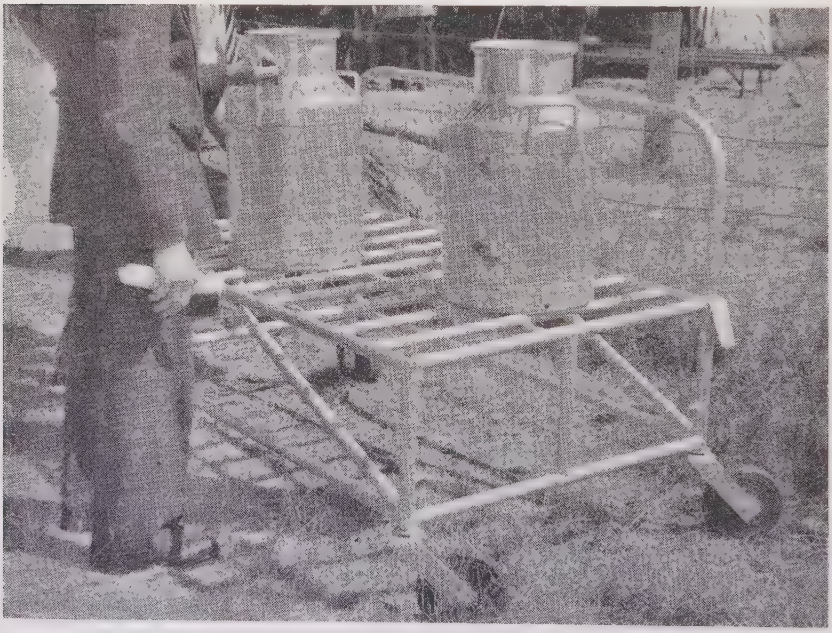

Toowoomba Farmers' Festival Entry. Trolley constructed by Mr. R. J. Northdurft, of Yalangur, from galvanised iron piping. This is used for transporting cans of milk from the milk room to the carrier's truck. It can also be used for the storage of empty milk cans.

The Fight Against Disease—IV.

Use These Disinfectants To Kill Germs

By G. C. SIMMONS
Senior Bacteriologist

Nowadays, every home almost certainly possesses a preparation classed as a disinfectant. This has resulted from an understanding of the part played by micro-organisms as a cause of disease, for a disinfectant is used to kill harmful micro-organisms, or pathogenic bacteria and viruses, so that man and animals are no longer exposed to them.

There is often confusion between "disinfectant" and "antiseptic". The term *antiseptic* is applied to those substances which may be used on living tissues and which may not kill the germs but only stop them from multiplying. A *disinfectant* is applied to non-living objects and usually aims to kill all micro-organisms on those objects. Sometimes the one compound may be used either as a disinfectant or an antiseptic.

Obviously a disinfectant will kill non-dangerous as well as dangerous micro-organisms but in prevention of disease the death of the non-pathogens is of no consequence.

There is one fact fundamental to efficient disinfection. The process is a chemical reaction between the disinfectant and micro-organism. *The disinfectant must therefore touch the living organism.*

This means that the micro-organism on the surface or in the material should be accessible to the disinfectant used. If dirt and organic matter are present, the disinfectant is rapidly put out of action and does not reach bacteria below the surface. Mud, dirt and heaps of excreta and rubbish cannot be penetrated by disinfectants.

Not so commonly realised is that cracks in surfaces such as joins in boards or metals are just as impervious once they have been filled with dirt and organic matter such as milk, excreta or bacterial growth.

Planning for effective disinfection starts with the provision of smooth surfaces where disinfection is likely to be required. Shiny, well-fabricated, stainless steel units not only look efficient but *are* efficient in this respect. Stainless steel is expensive, and for many purposes not desirable, but the principle of smooth surfaces can be applied to all finishes.

Concrete floors and walls of pens, cowsheds and other yards should have surfaces which are easily cleaned. Inadequate reinforcing or poor concrete mixes quickly result in cracks and wear which makes proper disinfection impossible.

Wood surfaces may be coated with a variety of paints which will produce a smooth, waterproof surface.

Smooth surfaces are easily cleaned and if this is done regularly micro-organisms are kept to a minimum. Clean surfaces rapidly dry, resulting in a considerable reduction of micro-organisms on the surface. Sunlight is also more effective on clean surfaces.

Two Stages of Disinfection

The process of disinfection consists of two stages. First, the surface must be cleaned thoroughly so that all dirt and organic matter are removed and the disinfectant can contact the remaining germs. Secondly, an effective disinfectant must be properly applied.

The first step is to remove all gross waste such as manure and bedding. This waste should be effectively disposed of by burning or burying.

Cleaning dirt from the surfaces is next. This cannot be done by hosing. The surfaces should be scrubbed with a brush using a detergent solution.

The detergent may be soap, caustic soda or one of the newer detergents sold commercially for dish-washing. It is a good idea to cover the area with the detergent and allow it to soften and penetrate the dirt before scrubbing. This cleaning process is also enhanced if the water is warm. The surface is then hosed with copious amounts of clean water. Treatment is repeated on areas still dirty

Caution is necessary if caustic soda is used. This chemical should be handled carefully and should not be allowed to come into contact with skin (rubber boots and other protective clothing should be worn). Also caustic soda will corrode many metals and therefore cannot be used as a general disinfectant.

Once the surface is clean and the disinfectant is able to reach the micro-organisms, the efficacy of the process will depend on these factors:—

(1) Efficacy of the chosen disinfectant;
(2) Concentration of disinfectant;
(3) Period of exposure to disinfectant;
(4) Temperature of application. Disinfectants are more effective at high temperatures.

There are many different disinfectants:

Hypochlorites

The most common disinfectants are those depending on their chlorine content for their activity. Hypochlorites are sold commercially either as liquids or solids. The manufacturer's instructions should be closely followed. If the amount of chlorine is too low, time and labour as well as disinfectant is wasted.

Hypochlorites kill bacteria rapidly on clean surfaces but are rapidly put out of action by organic material. They are extensively used on dairy equipment and in dairy factories. They are generally non-irritant to the skin. As a solution of hypochlorites readily deteriorates, fresh preparations should be made frequently. Hypochlorites are usually diluted so that the solution contains not less than 100 parts per million of available chlorine. They are slightly corrosive on tinned utensils.

Phenolic Disinfectants

Although the germ-killing power of phenol (carbolic acid) has been used as a standard for other disinfectants, it is not used much in practice. More common is another coal tar derivative, cresol, which when combined with soap gives the disinfectant known as lysol. This is a good disinfectant for general use. It should be used as a 5 per cent. solution, that is, approximately 1 part to 2½ gal. of water. In handling the undiluted disinfectant, take care not to allow any to touch the skin.

This type of disinfectant has a strong odour which milk readily absorbs.

It is best applied by flushing or spraying over the surfaces or, if only a small article, by immersion. Compared with the hypochlorites, lysol is slow-acting and at least 5 minutes' contact should be allowed.

Caustic Soda

Providing care is taken in handling this chemical, a 2 per cent. solution of caustic soda is a very good disinfectant. The surface to be treated may be scrubbed with 2 per cent. caustic soda to get rid of the organic matter. It is not very effective against tubercle bacilli.

Formaldehyde

Formaldehyde can be used either as a gas or as a solution. The gas is a very effective disinfectant and is used where a room or container can be sealed for a period. It is particularly useful for disinfecting hatchery incubators.

The gas is produced by mixing formalin with potassium permanganate (Condy's crystals).

Formalin sold commercially is a solution containing approximately 40 per cent. formaldehyde. Formalin may be used as 5 per cent. solution made by adding 1 pint of formalin to 2½ gal. of water. Formaldehyde given off by the solution is rather irritating to the eyes.

Oxidising Agents

Hydrogen peroxide and potassium permanganate are examples of the oxidising agent type of disinfectant. They are readily put out of action by organic matter and are relatively expensive so are not recommended for general use.

Quaternary ammonium compounds

Quaternary ammonium compounds are relatively new synthetically-produced disinfectants. Because they act quickly, are non-irritating, non-corrosive and relatively odourless, they have been used extensively in recent years. They are also detergents and therefore will penetrate more readily than most disinfectants. Hard waters slow down their action so it is preferable to use soft water (rain water) to dilute them. Usually they are sold as liquids. They are useful for dairy utensils.

Chlorhexedine

Chlorhexedine is a new type of chemical compound which may become more prominent in dairy hygiene, as preliminary reports indicate that spread of mastitis is prevented to some extent by its use. It is non-irritant.

Each of these disinfectants has its own advantages and disadvantages. In application, each should be used as directed by the manufacturer, making sure that the concentration is correct and that period of contact is sufficient. Prior cleaning of the surface is an essential prerequisite and if not done, the disinfectant is wasted.

When and How To Use

Disinfectants should be used only when it is impossible to use heat sterilization. Contaminated bedding, hay or bags and carcasses should be burnt if possible. Barns, sheds, poultry houses and dairies may become contaminated from infected discharges such as urine, faeces and milk.

In dairies, regular use of a disinfectant is essential to keep mastitis to a minimum. Omitting the procedure at only one milking may allow infected milk to spread by way of teatcups and hands to several other animals in the herd.

Whenever cows abort, the discharges from the vagina as well as the foetal discharges may contain millions of pathogenic bacteria or protozoa. The membranes should be burnt and the surface covered with discharge should be disinfected. When the discharges are spread on the ground, the only effective way to kill the germs is to pour petrol, kerosene or oil on the contaminated area and set it alight.

Particular care should be taken to disinfect surrounding surfaces when minor operations such as opening of abscesses is done and the purulent material is distributed.

Disinfectants should also be used for instruments such as knives for docking and paring before and during use. The best disinfectants for this purpose are those belonging to the phenolic types such as lysol and the quaternary ammonium types.

Hatching hygiene should include regular disinfection of incubators. Formaldehyde is the disinfectant recommended for this purpose and full details of the process may be obtained from the Department of Agriculture and Stock, Brisbane.

A final warning—all disinfectants should be kept in a safe place away from children!

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Stock and Station

DDT Dips Need Good Management. Its ability to kill cattle ticks with safety has won DDT a place in many dips in Queensland. The big advantage of DDT over related dip preparations is that ticks do not readily develop resistance to it at the strength usually used.

But results are likely to be poor unless you follow the manufacturer's directions carefully and stir the vat thoroughly before dipping.

The vat should be hand-stirred with a wooden or metal stirrer for 15 minutes before the stirrer cattle are run through. Use of stirrer cattle is an addition to, not a substitute for, hand stirring. Samples of dipping fluid should be taken immediately after each dipping and sent to the Animal Research Institute at Yeerongpilly for analysis. From the analysis you can work out the correct amount of DDT you should add to bring the dip up to strength.

—*C. R. MULHEARN,*
Director of Veterinary Services.

Cost of Hand Feeding Sheep. Wool prices, although improved, are far from permitting the elasticity in regard to capital outlay for sheep husbandry that was enjoyed by sheepmen in earlier, high-price years.

As a case in point, very careful consideration is now needed before a decision is reached on the commencement of supplementary or handfeeding of sheep. The decision once made can commit a sheepman to monetary outlay, and he can only guess when the drought will terminate. Remember that agistment or scrub feeding is generally much cheaper than artificial feeding. Before making a decision regarding supplementary or handfeeding, go carefully into the following considerations:

1. What part, if any, of the flock, should I feed?
2. What is likely to be the market value of sheep at the end of the drought?
3. For how long is it probable the feeding would have to continue?
4. What is the present availability and cost of foodstuffs?
5. What will feeding cost me?

—*R. B. YOUNG, Senior*
Adviser in Sheep and Wool.

Vaccinating Chickens. Vaccinating chickens at day-old or when they are still very young is gaining in popularity particularly now that coccidiosis is being effectively controlled. This early vaccination is to be encouraged, because it ensures that the practice is carried out, especially where chickens are being hatched throughout the year.

However, one big drawback to early vaccination is the fact that chickens huddle close together in chick boxes or battery brooders. Conditions of warmth and humidity are most conducive to the spread and multiplication of the virus, so that here we want to issue a word of warning. Do not contaminate the feathers or fluff of chickens with surplus vaccine, or touch the head of the chicken with contaminated hands. The vaccinator should handle only the vaccine and needle and leave all the holding to the catcher.

Vaccinate day-olds with a needle, and any chicken over a fortnight old in the usual place on the leg. A brush tends to leave too much vaccine on small chickens, resulting in infection in the brooder.

—C. MANNING,
Senior Adviser, Poultry Branch.

Drugs for Coccidiosis. Standards Branch has accepted for registration preparations which control the poultry disease, coccidiosis. They all give some measure of control against this disease.

Sulphamerazine and sulphadimidine, two of the early drugs, are administered in the drinking water after symptoms appear.

As a preventive measure or for treating outbreaks, sulphaquinoxaline and nitrofurazone are available. Preparations containing these drugs may be used either in the feed or in the drinking water.

Nicarbazin is a comparatively new drug, administered continuously in the feed as a preventative only but it should not be fed to laying stock.

The recently introduced drug, zoalene, can be mixed with the feed or water for either the prevention or treatment of outbreaks.

When using these drugs, the manufacturers' directions should be followed in detail as these have been closely scrutinised by qualified Departmental officers.

—A. R. HUGHES, Registration
Officer, Standards Branch.

Timely Tips for January

January may be the month to look to drainage and sanitation of calf pens, pig pens, and bails.

Clean, well-drained pens will help control worms and diseases in pigs and calves. In and around the bails, good drainage will help you beat footrot and mastitis.

You may have to treat for worms if the season and the condition of the animals warrant it. This is in addition to your routine treatments through the year.

Watch for ticks—even on young calves.

This might be the time to get together with your neighbours to arrange with your local vet. for group Strain 19 inoculation later in the year (maybe about April).

Make a new year resolution to keep breeding records of your cows. Control the bull and hand mate. If five out of the first 10 cows mated return to the bull, get veterinary advice immediately. Infertility may be starting in your herd. Early action will save a lot of trouble later.

* * *

Book on Livestock Diseases

DISEASES OF LIVESTOCK by T. G. HUNGERFORD, B.V.Sc., H.D.A.

A fourth edition of this well-known and highly informative book has been published by Angus & Robertson Ltd. As stated in the introduction to the book, the subject matter was compiled originally as lecture material for students at Hawkesbury Agricultural College. In book form the earlier editions were intended for the use of farmers, graziers, agricultural college students and non-graduate extension workers. The last two editions and particularly the fourth, have been more technical in scope. This appears to have been done with the view to making the book useful for veterinary surgeons as well as the other classes of readers mentioned. As a result the book now tends to fall between two stools. Nevertheless it remains an astonishing compilation of knowledge which will no doubt be eagerly sought after by all who wish to become well informed on livestock diseases. There are 602 pages in the text and an index of 21 pages. The price is 80s. (It should be pointed out that diseases of poultry are not dealt with in this book. Mr. Hungerford is the author of a separate work in that field.)

Keeping Hens In Laying Cages—II

By R. V. BYRNES, Poultry Branch

One of the chief advantages of the cage system is the fact that an accurate record can be kept of each hen's performance.

This is a very important factor from the point of view of culling unproductive birds. However, the keeping of complete records for every layer on a large egg-producing farm can be a time-consuming job. For this reason it is common to find farmers keeping records only on those hens that do not appear to be laying. With two birds to a cage, it is only possible to record cage production, and to use this as a guide for visual culling. Accurate production records are of great value in a breeding programme where production testing of individual birds is necessary.

Various devices can be used to keep records of production, for example, chalk marks on feed troughs, weekly egg counters and detailed individual production cards.

Production cards can be damaged easily by insects or by the birds. One way of overcoming this is to tack the cards to a length of pine board and have a second length of pine board hinged to the first so that it closes over the cards like a lid. (See Plate 2).

Grace Period

Whichever culling system is used, the farmer can make one of two mistakes. He can cull the pullet too early before her potential production is reached or he may cull too late, thus wasting food and cage space.

For this reason, it is essential to delay culling for a certain period after the pullets are placed in the cages. This grace period can be anything from one to two months. If pullets are placed in cages at four and a half months, as is normal in Queensland, first culling should take place at five and a half months, and certainly no later than six and a half months. Of course, this doesn't include birds which are diseased or obviously unfit as these should always be removed as soon as they are noticed.

It is necessary to vary the length of the grace period with the hatching date, that is, pullets hatched during September or later should be given a longer grace period than pullets hatched from May to August, as the late hatched pullets will take up to a month longer to come into production.

CULLING

Basically there are three main schemes that can be used by the cage farmer. These are: (*a*) culling on physical appearance; (*b*) culling on records, and (*c*) a combination of visual and record culling.

(a) **Physical Appearance**

Culling on physical appearance is based on comb condition, beak and shank pigmentation, early moulting and general appearance and handling of the bird.

The system may increase returns by up to 40 per cent. as compared to no-culling but the effectiveness of the system depends entirely on the experience and skill of the farmer.

(b) **Culling on Records**

If culling on records is too severe, it defeats its own purpose by increasing the number of replacements required until the process becomes uneconomical. Culling systems based on records are most effective when used in conjunction with single bird cages, where records of individual production can be kept accurately. Where two-bird cages are being used, *cage* production only can be recorded, and once this drops below a predetermined level for a certain period, the farmer has to cull the unproductive bird on appearance.

Where a scheme of continuous record culling is being used and pauses are used as a basis for culling, best results will be obtained by using the first nine to 12 day pause. This system is reported to increase returns by up to 60 per cent., as compared to no-culling and it has an advantage in that its effectiveness does not depend on the experience of the farmer.

Recently, poultry research workers in California evaluated the methods of recording used in cage plants in that State. They found that the recording of all eggs laid in one week in every four gave a very good guide to the total performance of the flock.

A high degree of accuracy in culling could be gained if it was based on non-laying over four consecutive days or alternatively a bird laying less than three eggs a week.

(c) **Combination Culling**

The "combination" system combines visual and record culling, and its effectiveness will depend to some extent on the ability of the farmer to cull visually. Most farmers use this system automatically, as unfit or diseased birds are culled as soon as they are noticed regardless of the system of culling being used.

REPLACEMENTS

In Queensland, the rearing of replacement stock should be confined to March to October. Chickens hatched during the summer months do not rear so well and are slower maturing than chickens hatched at other times of the year.

At least six batches of pullet chickens should be reared during this period to provide a reasonably constant rate of production per cage during the year. Also, by doing this, brooding equipment can be used to the best advantage. As hatching date must be taken into consideration when culling, each hatch should be grouped together in certain rows or sections of rows within the shed. The number of replacements required will depend on the severity of the culling system which is being used. Also, the number required will vary from month to month as the number of culls will increase after the birds pass their peak of production.

Experience will be the best guide when estimating the number of replacements required. Even though no replacements are reared from October through to March, it doesn't follow that culling should be curtailed in the corresponding months of February to June. The normal culling programme should be continued throughout this period as it costs more to feed an unproductive bird than to maintain an empty cage.

DEBEAKING

All birds destined for laying cages should be de-beaked. Debeaking will prevent vices such as feather picking and cannibalism. It assists also in reducing food wastage, particularly where pelleted feeds are being used. Birds of any age can be de-beaked, but best results will be obtained if it is done at seven days of age. At this age, it is necessary to remove from one-third to half of the top beak.

LICE CONTROL

As birds in cages don't have a chance to rid themselves of lice by natural means such as dust bathing, they are particularly susceptible to lice infestation. It is therefore necessary for the cage farmer to adopt a regular programme aimed at lice control. Before pullets are placed in the laying cages they should be dusted, dipped or sprayed thoroughly with either a ·5 per cent. BHC or a 1·5 per cent. DDT insecticide. This ensures that the pullets are lice-free when they enter the cages.

At regular intervals, a number of the caged birds should be selected at random and examined to see if lice are present. If an infestation of lice is detected, control measures as described previously will have to be used. However, dusting and dipping are both time-consuming and laborious and for these reason, cage farmers prefer to spray the birds with a 1·5 per cent. DDT or a ·5 per cent. BHC solution.

Recently the use of a ·5 per cent. Malathion spray has proved very effective in controlling lice and tropical fowl mite infestations. High pressure sprayers are the most suitable for this purpose as it is necessary to wet the birds thoroughly. The spray should be directed onto the birds both from above and below the cage to ensure "all over" wetting. Knapsack type sprays are quite suitable for applying the spray. If a BHC spray is used, feed troughs should be covered to stop the spray getting onto the feed, otherwise the BHC will cause objectionable flavours in the eggs. Strips of plastic or some other waterproof material are suitable for covering the feed troughs.

Be careful not to "overspray," as this will cause undue wetting of the droppings.

FLY CONTROL

Moisture and warmth make poultry manure an ideal breeding ground for flies. Without moisture, flies cannot breed. It is obvious that any control measures should be aimed firstly at the condition of the droppings. The cage shed should have ample overhang (at least 3 ft. to stop rain blowing in and wetting the droppings. The floor should be constructed to allow drainage of moisture away from the droppings to the outside of the shed. The condition of the droppings when voided by the birds should be watched closely and if too moist, attention should be paid to the salt content and/or fibre level of the ration as outlined previously. If the water supply is other than "town," a check on the mineral content should be arranged with the Agricultural Chemist of this Department.

Drip trays and water pipes should be inspected for leaks, and repaired where necessary.

In the cooler months of the year, there is no need to remove droppings as frequently as during hot weather, when conditions for a fly build-up are ideal. In summer, it may be necessary to clean out droppings as often as once a week.

As an additional fly control measure, droppings could be sprayed with a solution of Dieldrin at intervals of one to two weeks.

COOLING DEVICES

Layers kept on wire are more susceptible to heat stroke than others, because they are surrounded on all sides by hot air and are subject to heat radiation from the roof and reflected heat from the ground. Caged layers can't lose heat by dust bathing and stretching themselves on cool floor litter as is the case with floor layers.

Layers in cages begin to show discomfort once the temperature goes above 90 deg. F. and deaths will occur if it goes above 100 deg. F. for any length of time. Heat waves will adversely affect egg production, egg size and shell thickness.

The use of insulated roofing materials such as asbestos-cement will assist in reducing heat radiation from the roof. Where a drip nipple system is in use, an extra supply of water can be provided by allowing water to flow down the drip trough.

The quickest and most effective method of cooling birds in cages is to wet them lightly with a fine mist or spray of water. As an emergency measure, a hose may be used, but a more efficient and permanent system is to have overhead water pipes fitted with nozzles which give a very fine mist spray. For efficient operation of these nozzles, the water pressure should not be below 25 lb. a square inch. A fine mesh strainer stops particles of rust, dirt, and so on, from clogging the nozzles. The nozzles used should give a wide angle spray that is, 120 deg., and should not use more than 3 gal. of water an hour each.

Mist spraying for 10 to 15 min. in every hour should be sufficient to keep the birds comfortable, while at the same time, droppings have a chance to dry out between sprayings. The nozzles should be mounted at an angle of 45 deg. to stop dripping after spraying is stopped.

In a single aisle shed, one ½ in. spray line with nozzles spaced at intervals of 5 ft. will give sufficient coverage. In a wider shed, it will be necessary to have two or more lines to give complete coverage.

Spraying water on top of the roof is not a very effective method of cooling a shed and, besides, it requires much more water than does a fogging system.

Painting the roofs of the cage sheds with a light coloured paint, for example, white or silver, will result in some of the sun's heat being reflected and will assist in reducing the internal temperature of the shed.

WIND BREAKS

Cold prevailing winds will cause a drop in egg production from caged layers, unless provision is made for some sort of windbreak. The ideal windbreak should be so constructed that it can be removed or adjusted in summer to allow breezes to enter the shed to cool the birds and dry out the droppings.

Windbreaks can be divided into two types, natural and artificial. Natural windbreaks include belts of trees left standing, or planted on the windward side of the cage sheds, or any natural feature such as a hill or ridge which may give some shelter from prevailing winds.

Artificial windbreaks include constructed wooden, metal or fibro windbreaks either attached to the shed, or placed at a distance from it. Whatever the situation, it is always a sound plan to have a windbreak of trees on the windward side of the cage sheds. Make sure, however, that the positioning of the windbreak does not restrict future expansion.

In addition to a natural windbreak, it is necessary to provide some type of artificial windbreak. Where sheds are placed side by side, it will only be necessary to provide windbreaks on the end of each shed and on the side of the shed furthermost exposed to the prevailing wind. Provided that the sheds are not more than 25 ft. apart, each shed acts as a windbreak for the next. The maximum distance that a windbreak should be placed from the sheds can be estimated by multiplying its height by three. In Queensland, it is common to see sheets of flat asbestos-cement attached directly to the outside of the studs on the side of the cage shep with ventilation spaces of 1 ft. allowed above the cages and 2 to 3 ft. below. This type of windbreak is very effective in winter but is not particularly adaptable to summer conditions when extra ventilation is needed.

One type of windbreak which should suit Queensland conditions is one made of 4 in. by 1 in. wooden slats spaced three-quarters of an inch apart, and placed at a distance from the cage shed (see Plate 6). This type is effective at a distance of up to three times its height from the shed. The height of the windbreak can be from 6 to 8 ft., but it should be 6 in. to a foot higher than the eaves of the cage shed. Posts supporting the windbreak should be sunk 3 ft. in the ground and stayed on the leeward side. The lower section of this windbreak can be hinged to allow increased air circulation at ground level.

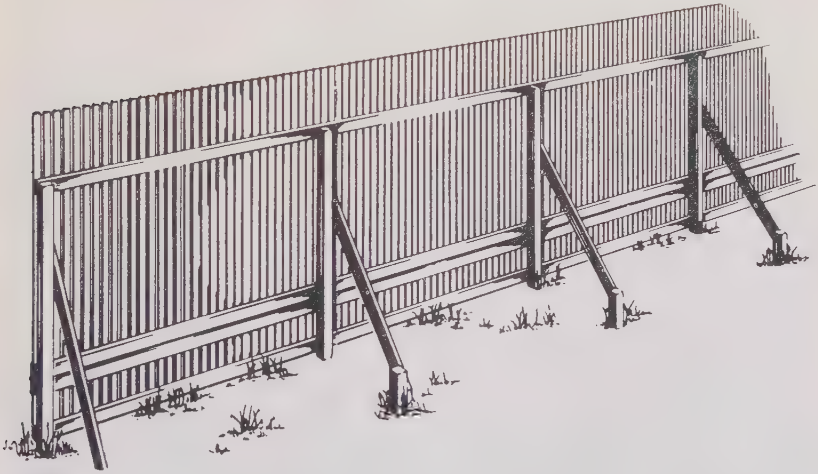


Plate 6

The Leeward Side of a Windbreak Made of 4-in. by 1-in. Wooden Slats Spaced Three-quarters of an Inch Apart. The lower section of this windbreak is hinged and can be folded up in hot weather.

PRODUCING CLEAN EGGS

Dirty eggs are not normally a problem with cages. After the egg is laid, it rolls out onto the egg tray in front of the cage out of reach of the hen. However, it will often be found that the wire floors of the cages slightly mark the eggs. These marks are caused by particles of manure, dust or rust, which adhere to the wire floor of the cage. Wire marked eggs will be more numerous if the bird's droppings are too moist. Cage floors should be brushed clean with a stiff brush whenever an increase in the number of wire marked eggs is noticed.

ARTIFICIAL LIGHTING

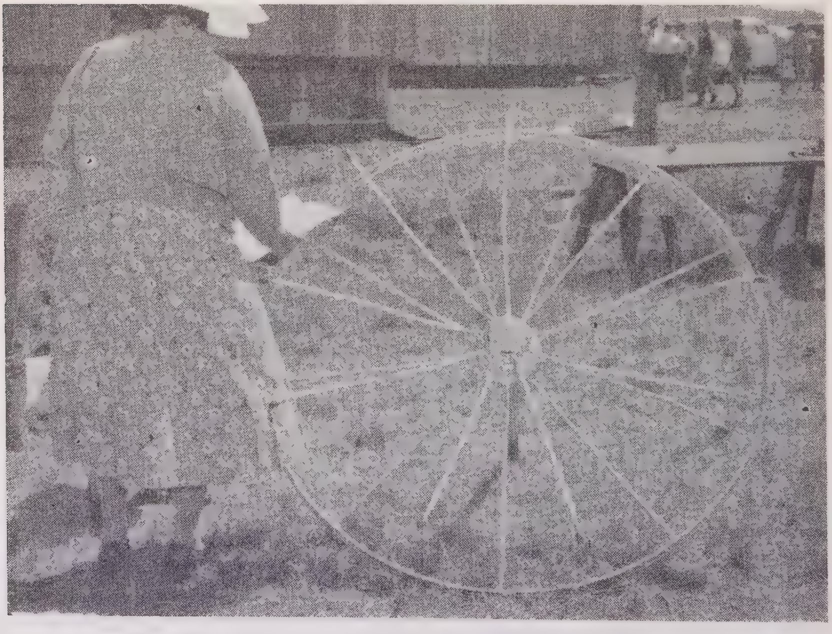
Cage layers respond equally as well to artificial lighting as do layers in deep litter sheds. The lights should be situated so as to give an even distribution of light throughout the shed. When calculating the number of lights and sizes of globes required, allow one watt to every 4 to 5 sq. ft. of shed area.

BREEDING IN CAGES

With the development of a suitable artificial insemination technique for poultry, breeding from caged layers is now possible. This is extremely important in breeding schemes such as the Full Sister or Dam Family System of breeding where it is necessary to record individual production of dams and to have positive identification of the progeny from each dam. Previously this would have entailed the use of trap nests or single test pens both of which require considerable time and labour.

* * *

Farm Gadget



Can Rack made by Mr. H. A. Beasley, of Chinchilla, is a Combine Wheel with Every Second Spoke Cut at Rim and Turned Up to Hold Cans. This is set on part of the axle embedded in the ground.

Protect Chickens And Poults Against Fowl Pox

By P. D. RANBY, Veterinary Officer

Vaccinating the new season's chickens against fowl pox is good management. Turkey poults should also be protected. The cost is only ¾d. to 1d. per bird for the vaccine. Although fowl pox is not a killer, it causes some setback in the affected birds. The disease is serious in laying flocks, where egg production is adversely affected.

Fowl pox is a virus disease of the fowl, pheasant and turkey. The disease can be spread from farm to farm by virus-carrying mosquitos which have fed from pox-affected birds. Such mosquitos remain infective for several months.

Note these Signs

Fowl pox has several forms, the most common in outbreaks on the farm being the presence of wart-like skin nodules on the unfeathered parts of the head—that is, the comb, wattles and eyelids of fowls (see Plate 1). Each skin nodule represents the bite of an infected mosquito. These nodules shrivel up after two weeks to form a scab which drops off. The scab material

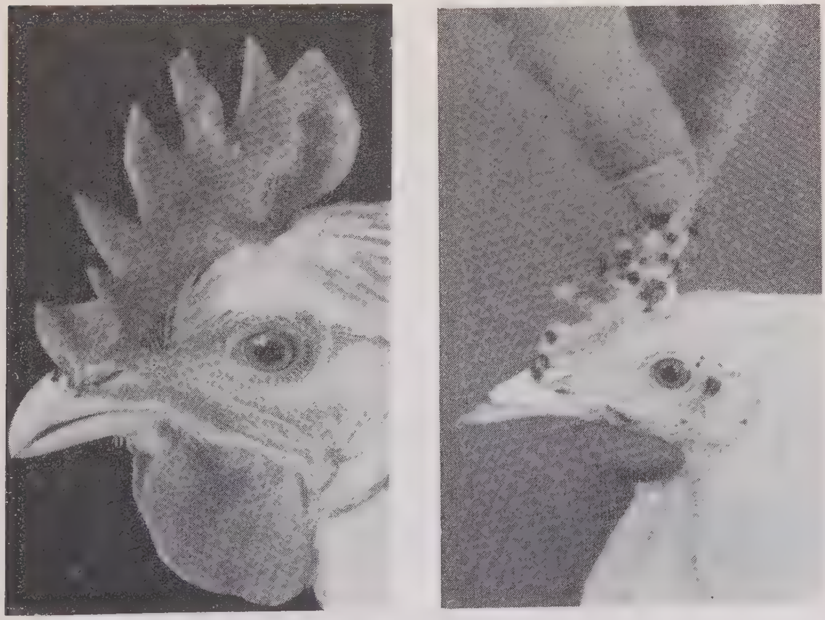


Plate 1

Left: **A Hen Showing Fowl Pox Lesions on the Comb.** The disease is more serious in laying fowls as egg production become affected.

Right: **A Debeaked Pullet Showing Numerous Fowl Pox Lesions on the Comb, Corner of the Mouth and Behind the Eye.** In both these cases, virus has entered the skin through the bites of infective mosquitoes.

contains the virus, which may then contaminate the birds' surroundings. The virus occasionally enters abrasions of the skin or mouth from the litter. When the virus penetrates the lining of the mouth, cheese-like "cankers" develop. Such "canker" cases suffer a severe setback and need to be destroyed.

Where many birds in an affected flock have developed pox lesions on the head, one may find an occasional bird showing respiratory distress, as evidenced by coughing and gasping for air. On examining such a case, a cheesy plug will be found in the top of the windpipe. This represents the respiratory form of fowl-pox. The incidence of this form is always small but it leads to confusion with other respiratory diseases.

Brooder fowl pox is a special form of the disease seen occasionally where chickens are kept in wire-framed brooders (see Plate 3). The virus enters the brooder in the first place by mosquitos. Virus contamination of the wire frame and other fittings on the brooder follows when affected chickens rub or bump the pox lesions against them. The next batch of chickens placed in the brooder are then exposed to the virus.

Since brooder chickens are rather prone to small scratches, the fowl pox virus enters these abrasions to produce large scabs. These scabs may be found all over the body in brooder fowl pox cases. In addition, fowl pox scabs have even been seen in debeaking wounds in battery brooded chickens.

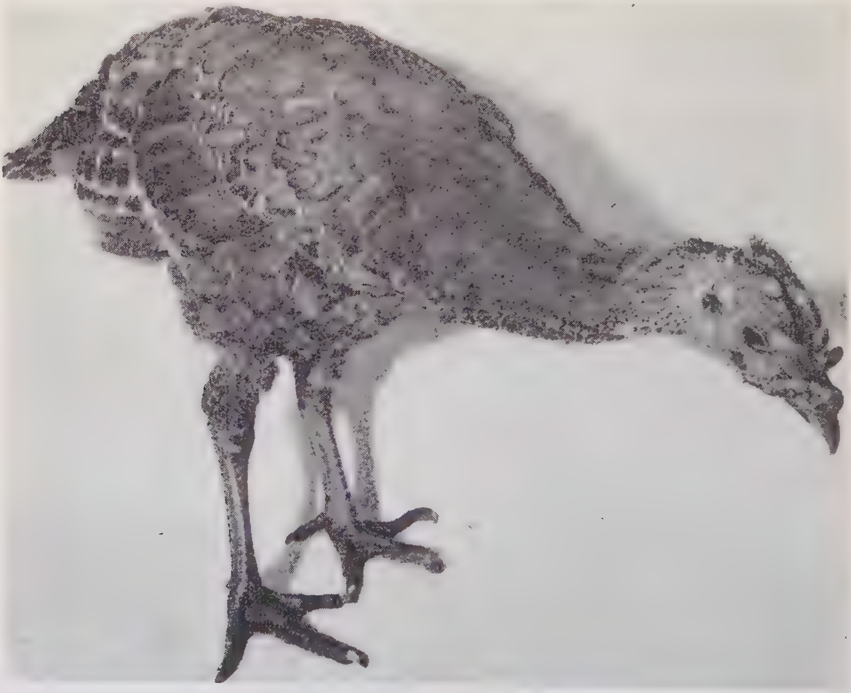


Plate 2

A Turkey Poult Affected by Turkey Pox. Note the pox nodules on the face and base of the beak. One nodule is also present on the left hock joint but is not so easily seen. Turkey pox is caused by the same virus as fowl pox.

Turkey pox in turkeys is caused by the same virus as fowl pox. (see Plate 2). However, the disease tends to be more severe in turkeys than fowls.

Two Vaccines Available

The two vaccines available for fowl pox vaccination of chickens are:

(*a*) Pigeon pox vaccine.

(*b*) Fowl pox vaccine.

These are supplied in 100 and 300 dose bottles. Remember, both pigeon pox and fowl pox vaccines contain living viruses and should be stored in a cool place, preferably in the refrigerator. The choice between them depends on certain factors which are outlined as follows:

(1) Fowl pox vaccine produces a life-long immunity following vaccination, whereas pigeon pox vaccine (C.S.L.) gives a temporary immunity lasting 4-6 months. Hence, other things being equal, fowl pox vaccine is preferred.

(2) Fowl pox vaccine is preferably used between 6 and 12 weeks of age; if done outside this age range some temporary upset is likely. However, older fowls may be done but not if they are laying or close to lay.

Pigeon pox vaccine may be used at any age and does not upset the birds in any way.

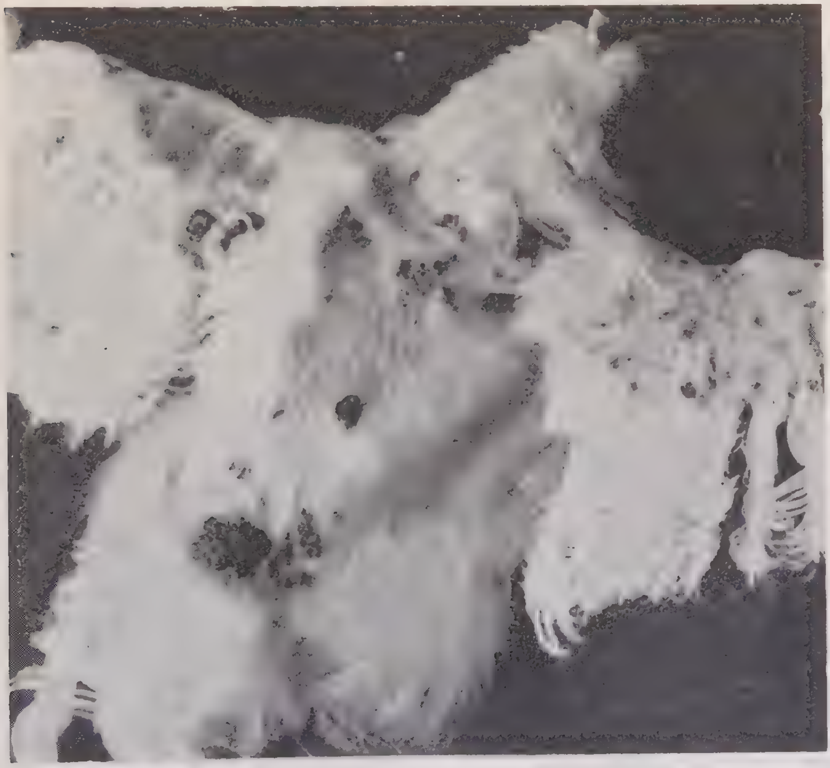


Plate 3

A Case of Brooder Fowl Pox in a Chicken Showing Numerous Large Scabs Distributed Over the Body. The virus in this case has entered small skin scratches from the virus-contaminated wire brooder.

(3) Fowl pox vaccine should not be used for unthrifty chickens such as chickens recovering from an attack of coccidiosis. Either use pigeon pox vaccine or postpone the use of fowl pox vaccine until later.

(4) Fowl pox vaccine should be used with caution if chronic respiratory disease (C.R.D.) is likely soon after vaccination. In any case, *never use fowl pox vaccine on chickens affected by "colds."* Use pigeon pox instead.

(5) Experience with pigeon pox vaccine is that it gives its best results in areas where mosquitos are prevalent. The reasons for this are not clear but it may be a consequence of what amounts to revaccination of the birds with fowl pox virus by infective mosquitos.

Thus it may be a good plan to use fowl pox vaccine in the cooler months and pigeon pox in the warmer months.

(6) In the case of chickens to be slaughtered for meat purposes, use pigeon pox vaccine, as a long-lasting immunity is not necessary.

(7) In the case of turkey poults, use only fowl pox vaccine, as pigeon pox fails to "take" in this species.

Age to Vaccinate

As pointed out earlier, this partly depends on the vaccine to be used. In general, fowl pox vaccine is recommended to be used on chickens 6-12 weeks old while pigeon pox may be used at any age.

A few farmers prefer to vaccinate day-old chickens with pigeon pox vaccine immediately after chick sexing and before placing them back in the brooder. Vaccination at day-old with pigeon virus is satisfactory although the immunity would probably be stronger if the vaccination were caried out some weeks later.

In the case of turkey poults, vaccinate at 1-2 months with fowl pox vaccine. If turkey pox occurs rather early, vaccination may be necessary as early as 2 weeks.

These Methods May be Used

Having selected a vaccine, the following methods of innoculating may be used:

(*a*) *For Pigeon Pox Vaccine*—Only the follicle method is suitable for pigeon pox vaccine.

(*b*) *For Fowl Pox Vaccine*—There are several methods available for innoculating fowl pox vaccines:

1. The follicle method using a special brush.

2. The stab method using a special two-pronged needle.

Thus two basic methods of fowl pox vaccination are in use, the follicle method and the stab method. Use a team of at least three where possible—a catcher, holder and vaccinator—in order to maintain speed. For the beginner, these methods will be described briefly:

The Follicle Method—The follicle method of vaccination is the one most commonly practised in Queensland, partly because it was used for mixed virus vaccines containing one of the pox vaccines with the virus of infectious laryngotracheitis (I.L.T.).

For the follicle method, one requires a special fowl pox brush as in Plate 4 (obtainable at the price of 6d each in Brisbane).

Make up the vaccine as directed or at the rate of 4 ml. (cc) for every 100 doses of vaccine. Where fowl pox vaccine is supplied for use by the stab method, extra liquid must be added if it is to be used for the follicle method. Use a liquid containing approximately 1 part of glycerine to 4 parts of clean water.

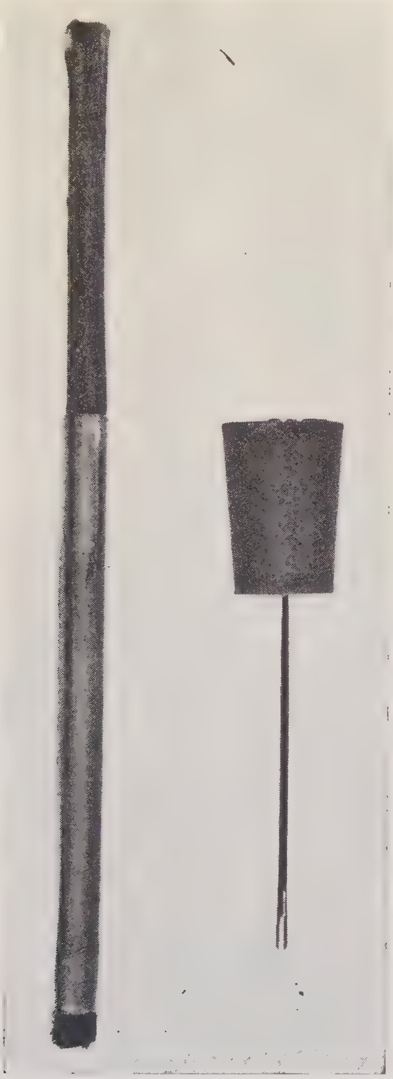


Plate 4

Fowl Pox Vaccinating Brush (Left) and Vaccinating Needle (Right). This vaccinating needle was made from an ordinary darning needle. Note the bevelled edges on the two prongs. The needle is used for the stab method of vaccination and the brush for the feather follicle method.

The holder grasps one or two chickens (upside down) and removes the feathers from an area of the outside of the leg just above the hock joint (the joint just above the shank). The vaccinator dips the brush in the vaccine bottle and wipes it lightly on the neck of the bottle to remove excess liquid. The brush is then rubbed several times on the exposed feather follicles, so that at least six follicles are thus inoculated. (see Plate 5). No hard rubbing is necessary.

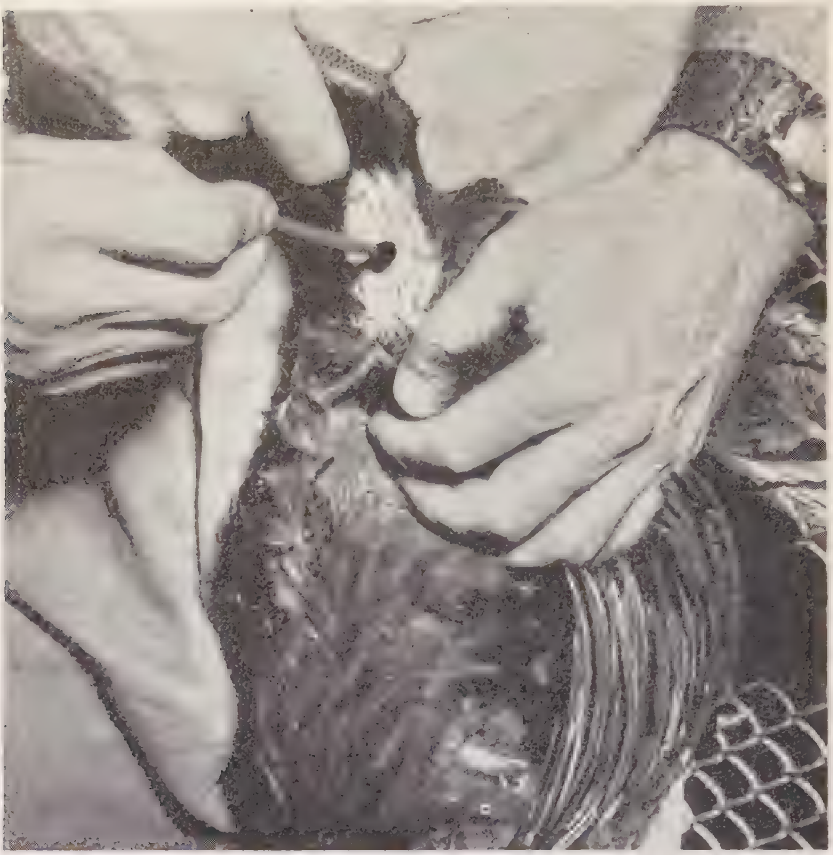


Plate 5

The Follicle Method of Fowl Pox Vaccination is Suitable for both Pigeon Pox and Fowl Pox Vaccine. Note that plenty of feathers have been removed from the leg and the vaccine is being applied to the feather follicles by the brush.

As the vaccination proceeds, the vaccinator will find that small feathers tend to collect on the brush. These should be removed, otherwise excess vaccine will be picked up by the brush, with the result that vaccine will be wasted.

The Stab Method—The stab method is faster than the follicle method provided that a team of three or more persons is used. The method requires the use of a two-pronged vaccinating needle (see Plate 6) which may be easily made from an ordinary darning needle as follows:

Select a darning needle 2-3 in. long. Cut through the eye of the needle so that two prongs of about $\frac{1}{8}$ of an inch are left. Push the other end of the needle (the pointed end into a cork or rubber stopper which now acts as the handle of the needle. The vaccinating needle now requires its two prongs to be sharpened and it is ready for use. Bevel each prong in turn (from the direction of one prong to the other.)

The site used for the stab method is usually a skin fold in the thigh of the leg as shown in Plate 6. Some vaccinators prefer the wing-web stab, which is quite suitable for chickens 4-6 weeks old. If much older than this, the wing web becomes rather thick and is more difficult to puncture.

Where the leg fold site is used (see Plate 6), the holder grasps 4 to 6 chickens upside down by the right leg and faces the birds' breasts to the vaccinator. A row of feathers

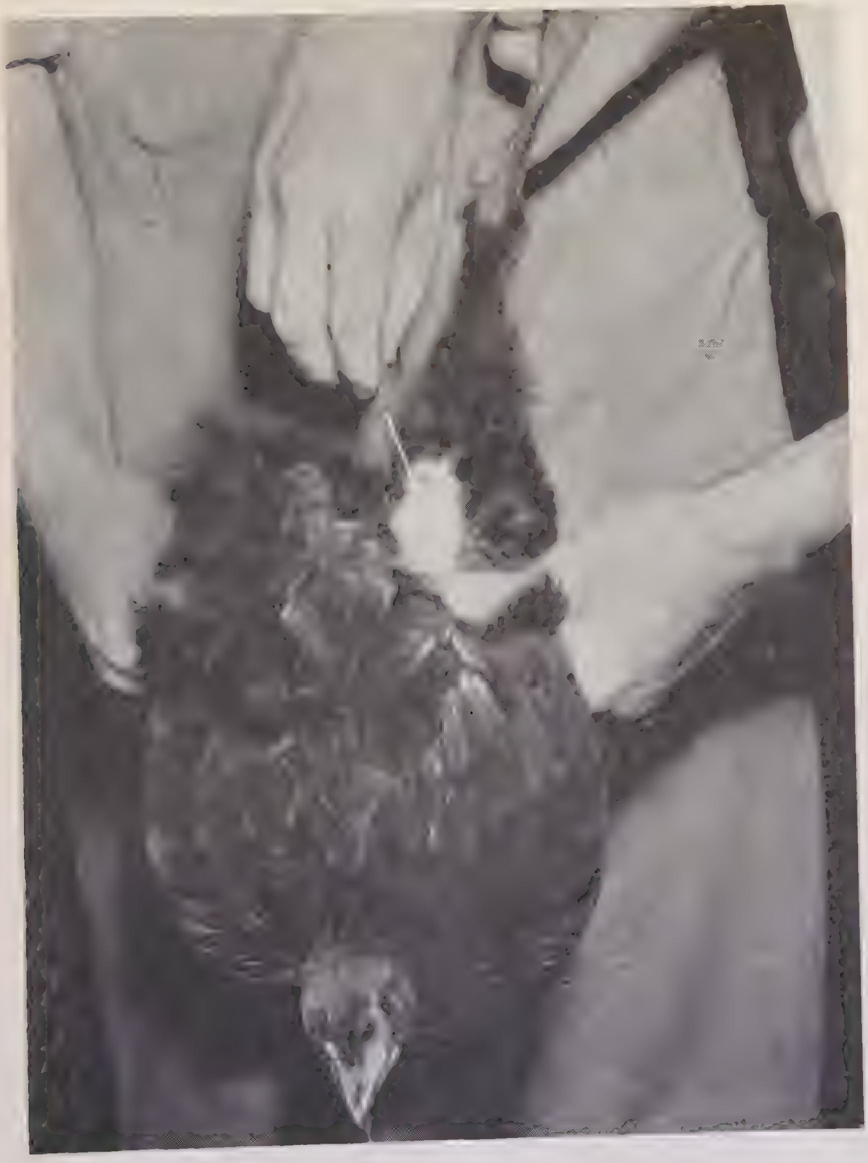


Plate 6

The Stab Method of Fowl Pox Vaccination Suitable for Fowl Pox Vaccination Only. Note the vaccinating needle poised ready to stab the fold of skin drawn away from the bird's thigh by the vaccinator.

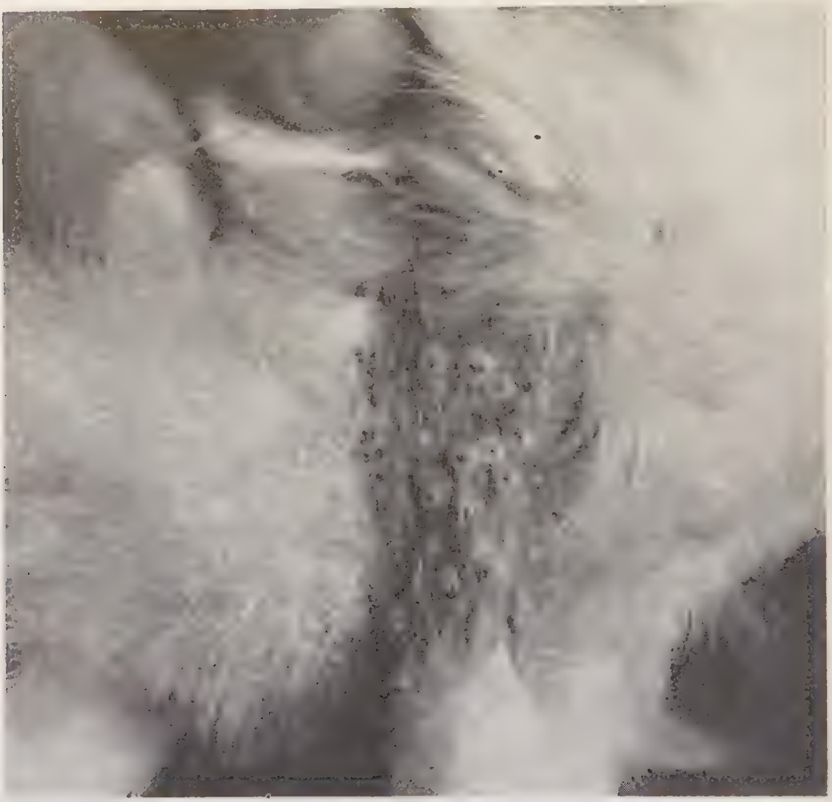


Plate 7

A Local Reaction or "Take" Following Pigeon Pox Vaccination. The swollen feather follicles are just starting to subside.

on the outside of the thigh is grasped by the vaccinator, pulling a fold of skin outwards with them (the vaccinating bottle is also held in this hand). Using the other hand, a dose of vaccine is picked up by the vaccinating needle which is then stabbed into the fold of skin. This is repeated, so that two stabs are used for each bird. As each chicken is vaccinated, it is released by the holder.

In the case of the wing-web site, the chicken is held upright and the needle is pushed right through the wing-web from the top surface to the bottom.

Reactions Following Vaccination

Following fowl pox vaccination, the feather follicles start to swell on about the fourth day and reach their maximum size from the sixth to tenth day. After this, the follicle swellings gradually subside. This reaction is referred to as a local reaction or "take" and indicates that the bird will develop immunity as a result of the reaction (see Plate 7). In the case of fowl pox vaccine, a crust or scab will be present on the top of each reacting follicule this being absent in the case of pigeon pox vaccine.

A systemic or general reaction follows the use of fowl pox vaccine, occuring on about the eighteenth day following vaccination. If the chickens eat a little less at this time and appear slightly dull, the effect is of little consequence as it passes off in a day or two. Pigeon pox vaccine does not produce this effect.

Check For "Takes"

The local reactions as described on the site of vaccination should be checked about a week after vaccination to make sure that the vaccine has "taken." This tells us that the vaccine was potent and the technique of applying it was successful.

Summing Up

- Fowl pox vaccination should be standard procedure for chickens and turkey poults, costing not more than 1d. a bird.
- Two vaccines, fowl pox and pigeon pox vaccine are available for chickens and the merits of each are described.
- Only fowl pox vaccine should be used for turkeys.
- The feather follicle method of vaccination is used in the case of pigeon pox vaccine.
- Fowl pox vaccine may be used by the follicle method or the stab method.
- Check for "takes" one week later.

* * *

"Beef Cattle Husbandry"

On three separate counts, use of hormones in beef production seems a definite advantage. Treated steers develop more beef and leaner beef on the same amount of food.

But this is only one side of the story. The use and possible abuse of hormones in beef production is still the subject of lively scientific debate.

Hormones cannot improve poor quality beef, but may, on occasions, make it worse. Then, apart from the question of human health, the risk to breeding cows from contaminated pastures or soil cannot be ignored. This question is, in fact, at present under urgent investigation.

A discussion on the use of hormones in the beef industry is given by Dr. Allan Fraser, Lecturer in Animal and Dairy Husbandry, University of Aberdeen, in the second edition of his *"Beef Cattle Husbandry."* In this edition, Dr. Fraser has added a completely new chapter on recent scientific developments. This chapter is devoted to discussion on performance testing, dwarfism, blood grouping and the use of hormones.

Dr. Fraser points out that research into beef cattle husbandry has come late on the scientific scene. In the past, agricultural scientists have given far more attention to dairy cattle, pigs and poultry. But, he hastens to add, it is possible to exaggerate the importance of this apparent neglect. For example, it is questionable whether performance and progeny testing are as novel in practice as they are in scientific research.

Another new chapter that will interest Australian readers deals with Indian cattle and their crosses. Here, the significance of Dr. Fraser's remarks on the Zebu's heat tolerance should be fully appreciated.

But rich as it is in beef cattle history, the book is directed mainly at the British cattleman.

Tuberculosis-Free Cattle Herds (As at 1st December, 1959)

Aberdeen Angus

Crothers, G. H. & H. J. "Moorenbah", Dirranbandi
Elliott, A. G., "Ooraine", Dirranbandi
Mayne, W. H. C., "Gibraltar", Texas

A.I.S.

Cox, T. L. & L. M. J., Seafield Farm, Wallumbilla
Crookey, J., Arolla A.I.S. Stud, Fairview, Allora
Davis, W. D. "Wamba", Chinchilla
Dennis, L. R., Diamondvale, A.I.S. Stud, Mundubbera
Edwards Bros. "Spring Valley", A.I.S. Stud, Kingaroy
Evans, E. G., Lauraven A.I.S. Stud, Maleny
Green, D. B., Deloraine, A.I.S. Stud, Fairdale
Heading, C. A., "Wilga Plains", Maleny
Henry, Mrs. K., Greenmount
Henschell, W., "Yarranvale", Yarranlea
H. M. State Farm, Numinbah
Littleton, H. V., "Wongalea", Hillview, Crow's Nest
Marquardt, A. C. & C. R., "Cedar Valley", Wondai
Mears, G. S. & E., "Morden", M. S. 755 Toogoolawah
Moore, S. R., "Sunnyside", West Wooroolin
Neale, D. G., "Groveley", Greenmount
O'Sullivan, Con., "Navillus", Greenmount
Phillips J. & Sons, "Sunny View", Benair, Kingaroy
Power, M. F., "Barfield", Kapaldo
Queensland Agricultural High School & College, Lawes
Radel, R. R. & Sons, "Happy Valley", Coalstoun Lakes
Roche, C. K., Freestone, Warwick
Sanderson, W. H., "Sunlit Farm", Mulgildie
Schloss, C. J., "Shady Glen", Rocky Ck., Yarraman
Scott, M. E. & E., "Wattlebrae", A.I.S., Stud, Kingaroy
Scott, W. & A. G., "Walena", A.I.S. Stud, Blackbutt
Shelton, R. A. & N. K., "Vuegon" A.I.S. Stud, Hivesville, Murgon
Sokoll, A. H., "Sunny Crest", Wondai
Sperling, G., "Kooravale", Kooralgin, Cooyar
Sullivan Bros. "Valera", Pittsworth
Sullivan, D. "Bantry", Pittsworth
Sullivan, F. B., "Fermanagh", Pittsworth
Thompson, W. H. "Alfavale", Nanango
Webster, A. H., "Millievale", Sabine, via Oakey
Wieland, A. W., "Milhaven", A.I.S. Stud, Milford, via Boonah

Ayrshire

Dudgeon, C. E. R., Marionville Ayrshire Stud, Landsborough
Dunn, T. F., "Alanbank", Gleneagle
Goddard, B., Inverell, Mt. Tyson, via Oakey
Holmes, L., "Benbecula", Yarranlea
Mathie, E. & Son, "Ainslie", Maleny
Scott, J. N. "Auchen Eden", Camp Mountain
Zerner, G. F. H., "Pineville", Pie Creek, Box 5, Post Office, Gympie

Friesian

Behrendorff, E. C., Inavale Friesian Stud, M.S. 786, Boonah
Macdonald, S. E. G., "Freshfields", Marburg
Naumann, C. H., "Yarrabine", Yarraman
Pender, D. J., Lytton Road, Lindum
Stumer, A. O., Brigalow, Boonah

Guernsey

Doss, W. H., Degilbo, via Biggenden
Fletcher, A. B. "Cossart Vale", Boonah
Holmes, C. D. (owner Holmes L. L.) "Springview", Yarraman
Johnson, G. L. "Old Cannindah", Monto
Miller, G. "Armagh Guernsey Stud", Armagh, M.S. 428, Grantham
Ruge, A. & Sons, "Woowoonga", via Biggenden
Sanderson, N. H. "Glen Valley", Monto
Scott, C., "Coralgrae", Din Din Rd., Nanango
Swendson, A. C., Coolabunia, Box 26, Kingaroy
Wissemann, R. J., "Robnea", Headington Hill, Clifton

Jersey

Beckingham, C. Trout's Rd., Everton Park
Birt, W. C. M., Pine Hill Jersey Stud, Gundiah
Borchert, Mrs. I. L. M., "Willowbank" Jersey Stud, Kingaroy
Burrows, R. N., Wondai, Box 23
Bygrave, P. J. L., The Craigan Farm, Aspley
Carpenter, J. W., Flagstone Ck., Helidon
Conochie, W. S. & Sons, "Brookland", Sherwood Rd., Sherwood
Cramb, S. A., Bridge St., Wilsonton, via Toowoomba
Crawford, R. J., Inverlaw, Kingaroy
Farm Home For Boys, "Westbrook"
Fowler. P. & Sons, "Northlea", Coalstoun Lakes
Harley, G., "Hopewell", M.S. 189, Kingaroy
H. M. State Farm, Palen Creek
Hutton, D. R., "Bellgrath", Cunningham, via Warwick
Johnson, H. G., Windsor Jersey Stud, Beaudesert
Lau, J. F., "Rosallen", Goombungee, Toowoomba
Matthews, E. A., "Yarradale", Yarraman
McCarthy, J. S., "Glen Erin", Greenmount, Toowoomba
Meier, L. E., "Ardath Stud", Boonah
Noone, A. M. & L. J., "Winbirra", Mt. Esk Pocket
Porter, F., Conondale
Queensland Agricultural High School & College, Lawes
Ralph, G. H. "Ryecome", Ravensbourne
Scott, Est. J. A., "Kiaora", Manumbar Rd., Nanango
Semgreen, A. L., "Tecoma", Coolabunia
Seymour, B. T., "Upwell", Jersey Stud, Mulgeldie
Smith, J. A. & E. E., "Heatherlea", Jersey Stud, Chinchilla
Tatnell, W. T., Cedar Pocket, via Gympie
Toowoomba Mental Hospital, Willowburn
Verrall, F. W., "Coleburn", Walloon
Weldon Brothers, "Gleneden", Jersey Stud, Upper Yarraman

Poll Hereford

Anderson, J. H. & Sons, "Inverary", Yandilla
Hutton, D. R. & M. E., "Bellgrath", Cunningham, via Warwick
McCamley, E. W. G., "Eulogie Park", Dululu
Maller, W., "Bore View", Pickanjinnie
Wilson & McDouall, Calliope Station, Calliope

Poll Shorthorn

Leonard, W. & Sons, Welltown, Goondiwindi

Important Uses Of Vegetable Oils

By M. J. PRICE, Agricultural Chemist Laboratory

Many industries are dependent on a continuous supply of vegetable oils; here is an outline of a few of the more important applications of these oils.

Vegetable oils are widely distributed in nature. In plants they are found chiefly in the seeds and fruit but they occur also in the leaves, roots and other vegetative organs.

Oils and fats (solid oils) have served the human race as food for centuries and besides being an essential part of the diet of man they also play an important role in many industries. Although the tropical inhabitant who first collected the oil exuding from sun-heated coconut kernel is regarded as the pioneer manufacturer of vegetable oils, there is little doubt that the first useful quantities of vegetable oil were obtained from the fruits of the olive tree.

The culture of the olive tree in Tunis dates from about the first century B.C. and although a great number of the original olive groves were destroyed by invading Arabs during the sixth century, the groves continued to develop and at the beginning of the twentieth century approximately 11,000,000 olive trees were growing in Tunis.

In Australia, at this time, 67,000 olive trees were growing and the fruit of these trees yielded almost 11,000 gal. of oil. A recent estimate gives the quantity of olive oil produced in Australia as 30,000 gal. valued at about £57,000.

Another important oil-bearing crop grown in Australia is the flax plant (*Linum usitatissimum*), a native of Central Asia. The gross value of the linseed crop in Queensland for the year 1958-1959 was about £500,000. Seven thousand tons of seed were harvested from 30,000 acres. The extracted oil is of great importance in the paint and varnish industry.

In Queensland the flax plant is grown to produce oil-bearing seeds, whereas in some areas of the world it is cultivated for flax fibre alone.

Although oils are found in nearly every type of plant, usually only those plants yielding commercially useful oils in sufficiently high quantities are of any economic importance. In certain instances, the oil obtained from a crop is of secondary importance; cottonseed oil is an example of this.

It has been said that the life and progress of a nation depend in no small measure on its supply of vegetable oils and fats. This statement rings very true when we consider that almost every home has a film of linseed oil in the form of paint on some area of its walls, either internally or externally or both.

Another instance is the widespread use of lubricating greases in motor vehicles. These lubricants are prepared in many ways but the general method is to dissolve vegetable oils in mineral oils and boil while adding a solution of an alkali such as caustic soda.

Three Groups of Vegetable Oils

The vegetable oils have been classified into three broad groups according to certain chemical and physical properties. They are: (1) The drying oils group, (2) The semi-drying oils group, and (3) The non-drying oils group.

The oils are arranged in these groups according to their ability to dry when exposed to the atmosphere, consequently we have the well-known drying oil, linseed oil, in group (1). Olive oil, a non-drying oil, is in group (3), while cottonseed oil, a semi-drying oil, is placed in group (2).

Of the chemical and physical properties used for classification purposes, the most important is the iodine value. This is a measure of the oil's ability to absorb iodine quantitatively and is determined by chemical treatment of the oil with an iodine compound. It is a most useful value because it gives an accurate measure of the oil's drying potential. The higher the iodine value the better are the drying properties of the oil, and it follows then that linseed oil, a group (1) oil, will have a higher iodine value than a group (3) oil such as olive oil. The approximate iodine values for three common oils of different groups are as follows:—

	Iodine value approx.
Linseed oil—group (1)	190
Cottonseed oil—group (2)	120
Olive oil—group (3)	80

In addition to its use as a classification criterion, the iodine value also gives an indication of the maturity of the seeds from which the oil was extracted and because of this it is extensively used for quality control.

Extraction and Refining

Since oils are obtained in all countries of the world, it will be readily understood that even the crudest methods of extraction and refining are still in existence. In the progressive areas, modern processing factories have been constructed containing efficient machinery and the bulk of the world's vegetable oil supply is obtained by using improved extraction techniques. The machinery required for the preliminary treatment of the fruit or seed must naturally vary with each particular variety. Therefore the preparatory operations for the removal of the coconut kernel will be entirely different from that necessary in the case of flax seed.

The following is a brief outline of the steps involved in the manufacture of raw linseed oil.

The first operation is the removal of any foreign material; this may include plant trash, sand and pieces of metal. The first two are generally removed by screening equipment while the latter may be removed by the use of magnets.

The cleaned seeds are then passed through a series of grooved rollers rotating at about 150 revolutions a minute, which crush the seeds and reduce them to the desired degree of fineness.

The ground seed or meal as it is generally termed is transferred to the cookers where it is moistened and steam-heated. This is a very important step and its main purpose is to soften the seed tissues and so facilitate the extraction of the oil at the pressing stage.

The cooked meal is finally subjected to high pressures in hydraulic presses and the expelled oil is led away to settling tanks.

The next step in the manufacture of raw linseed oil is the refining process which, like most oil treatment methods, has been subject to improvement over the years. As the oil user demands a higher quality product, so the manufacturer must improve his techniques in order to meet this demand.

The earliest methods employed for improving the oil consisted simply of storing it for a few years to allow the impurities to coagulate and settle. This way was too slow to meet the ever increasing demand, and a much more rapid method was developed.

This is known as acid refining and consists of treating the oil with sulphuric acid followed by the addition of large quantities of water.

The main drawback with this method is that it tends to increase the free acid content of the oil and this acid oil can have deleterious effects on the keeping qualities of prepared paints. Acid-refined oil is now considered inferior to that refined by the newer alkali technique.

The proportion of linseed oil in the seed varies with the variety of seed and with the climatic conditions prevailing during the growth of the crop. A yield of about 35 per cent. oil is regarded as average.

Plate 1

Examining a Linseed Crop at Yarranlea.

Edible Oils

The industries associated with the treatment and use of vegetable oils are so numerous and varied that this account can only serve to acquaint the reader with the more important products obtained from these oils. It is of interest to note that a high proportion of the vegetable oils is suitable for edible purposes provided they are prepared from fresh, undamaged seeds which have not been heated during the extraction process. In India, cold-pressed linseed oil is used extensively as a table or salad oil whereas in many other countries this is replaced by peanut oil, cottonseed oil and olive oil. Olive oil is also of importance in the tinned fish industry.

Vegetable oils play an important role in the production of butter substitutes and in the early years of margarine manufacture, coconut oil was extensively used. In addition, cottonseed oil, peanut oil, sunflower seed oil and sesame oil have all been used in margarine.

The oils chosen should be completely neutral in flavour and odour and this is usually accomplished by careful deodorization.

The chief raw material used in the manufacture of margarine is "oleo oil," a low-melting-point animal fat, and this is blended with the vegetable oils in the ratio of approximately 3:1. The blend is heated to the desired temperature in a vessel equipped with an agitator and a previously treated volume of milk is added to form a water in oil emulsion.

This mixture is allowed to cool and is passed through various solidifying processes in order to produce a plastic fat having similar physical properties to butter.

Plate 2

A Crop of Safflower of the Horowitz Variety at Bowenville.

Plate 3

Harvesting Linseed at Yarranlea.

Paint and Varnish

Perhaps the most important outlet for vegetable oils in Queensland is the paint and varnish industry in which linseed oil is used. Linseed oil can be treated in a variety of ways to enhance its value as a paint medium, and the paint technologist takes into account the different properties of each type of oil when formulating a paint. The oil may be polymerised (thickened), boiled or blown, it may also be reacted with other chemicals to produce a variety of varnishes which are widely used in enamelised coatings.

Linseed oil is not the only oil capable of thickening; such oils as safflower, tung, castor and sterculia have been successfully treated.

Thickened oil is used in the manufacture of printer's inks, lithographic varnishes, plastic wood and linoleum; only a small amount is used in the manufacture of paints.

Raw linseed oil takes about three days to dry when exposed to the atmosphere. However, this period can be shortened to 6 to 8 hours by the addition of small amounts of accelerating substances known as driers. These driers are usually mixtures of cobalt, manganese and lead compounds and when added to the linseed oil during heat treatment of the oil, the so-called boiled oils are produced. The types of driers used and their concentrations play a very important part in the durability of the coating; excess manganese can cause film embrittlement while excess cobalt can cause the paint film to wrinkle.

The manufacture of alkyd resin varnishes based on linseed oil is a comparatively new industry and the varnishes produced are the ultimate where high gloss retention and quick drying are desired features. Large reacting vessels capable of producing thousand gallon batches of synthetic varnish per cycle are in use in a few factories in Australia. By reacting different organic chemicals with linseed oil under controlled conditions, a wide variety of varnishes may be produced.

The particular feature desired in the finish can be tailor-made into the varnish and by this method varnishes can be prepared for flat enamels, full gloss exterior and interior finishes, alkali resistant finishes and thixotropic coatings.

Small quantities of other high iodine value oils such as tung oil and safflower seed oil are incorporated into varnishes to impart special properties to the finished coating. However, the use of drying oils other than linseed oil is limited and linseed oil will remain the major paint and varnish medium for many years hence.

Many Kinds of Soap

Vegetable oils are also used in the manufacture of soaps. These may be prepared from almost any oil and consequently a large variety of soaps are available for both domestic and industrial use.

The general method of preparation is to introduce an excess of dilute caustic solution into a heated volume of oil. Salt is then added and two layers are obtained; the lower aqueous layer contains salt, glycerine and any excess caustic. The upper layer consists of a curdy mass of soap containing about 30 per cent. moisture.

The curdy mass is mixed with water and boiled and separation into two layers is again effected.

The process is repeated and the soap curd is then transferred to mixing machines where any necessary additions are made.

Finally the mixture is poured into soap frames where it is allowed to cool for a few days before it is cut and packed for sale.

Included in the variety of soaps available are soft soap, hard soap, liquid soap, medicated soap, floating soap, disinfectant soap, sand soap, powdered soap and transparent soap.

Coconut oil soaps have the property of lathering in "salty water" and this oil is used in enormous quantities in the preparation of good quality shampoos and soaps.

The few industries mentioned will serve to convey to the reader the versatility of vegetable oils and their value to a modern community. The lesser known vegetable oils such as those obtained from the seed of the raspberry, the pumpkin and the grape could all be processed and used if the need ever arose. In fact, grape seed oil is used as a table oil in some Mediterranean countries.

Sometimes two oils have such similar properties that they may be interchangeable in a particular industrial process; when this occurs the oil available at the lowest price will be sought and used.

The vegetable oil industry of today is an enormous concern and its position in the industrial world is a credit to the skill and achievements of its technologists.

* * *

Plate 1: **Analytical Checking in the Laboratory.**

Check on Agricultural Chemicals

By N. D. IRWIN, Registration Officer, Standards Branch.

All pest destroyers offered for sale in Queensland must be registered with the Department of Agriculture and Stock; State law thus enables a check to be kept on the quality and directions for use of all agricultural chemicals.

This check includes evaluation of the formula in relation to its suitability for the purpose for which it is advocated and the subsequent analyses of samples obtained from retail stores to ensure that the material being sold is manufactured in accordance with the registered formula.

The directions and claims set out on the labels are carefully scrutinized by the Agricultural Requirements Board, which makes recommendations on each application for registration. This Board is guided in its decision by the results of investigations carried out by specialist officers of the Department who are continually working with modern pest destroyers.

Registration is for the benefit and protection of the user. If you use these materials either as a farmer or a household gardener, you should read the labels carefully and carry out the instructions to the letter, using the correct dose rates.

Do not think that the use of excessively strong sprays or dusts gives any better control. It is not economic, the residue is more toxic and the excessive concentration may destroy beneficial insects.

Fight Against T.B.

Veterinary science is winning hands down a fight to eradicate tuberculosis from dairy herds supplying milk to Queensland's cities and towns. Records from the State's compulsory tuberculosis testing scheme show a progressive decline in the incidence of the disease.

There were only 0·12 per cent. reactors among the 300,000 dairy cattle tested last year. The previous year, there were 0·25 per cent. reactors in half-a-million cattle and in 1953-54, 0·75 per cent. reactors in 380,000 cattle.

Although 800,000 head are covered by the scheme, most cattle are tested only once every two years owing to the satisfactory eradication position.

These figures show that the incidence of tuberculosis in dairy herds is one-sixth of that four years ago and one-half of that one year ago. Further progress will probably be shown as complete eradication approaches and some testing will have to be continued to maintain freedom.

A compulsory testing scheme for dairy cattle was introduced in the Brisbane area some 12 years ago. Since then, almost all the dairy cattle between the border and Bundaberg, including the Darling Downs, Brisbane Valley and South Burnett have come under test. Testing is also carried out on all dairy cattle in the Rockhampton, Townsville, Cairns and Atherton districts. All cattle in the Biloela area have recently been included in the scheme.

A voluntary scheme exists for milk supply herds of the smaller towns.

Bovine tuberculosis is both a risk to public health and a source of loss to the farmer. Its eradication is, therefore, of prime importance to all sections of the community.

Fortunately, veterinary officers have a very efficient test to detect carriers of tuberculosis. It is applied regularly to all herds under compulsory testing and all reactors are slaughtered. By means of this test, the disease can be readily eradicated from a herd. But if herds are not tested, the disease can remain undetected for long periods.

Eradication by regular testing is the complete answer to bovine tuberculosis. The progress already achieved makes it clear that the disease is fast being cleaned out of Queensland dairy herds.

Continued testing will keep it on the run.

—K. M. GRANT,
Assistant Director of Veterinary Services.

Bean Seed Production In The Burdekin Valley

By E. P. WILLIAMS, Senior Adviser in Horticulture

Bean seed production in the Burdekin Valley is a relatively new industry. For several years past, the crop has been grown at the Ayr Regional Experiment Station, where methods of land preparation, crop management and harvesting are more or less standardised. However, commercial production in the district began only in 1957 when an acute shortage of good quality seed in Australia focussed attention on the need for production in areas where climatic hazards were low and the risks of disease outbreaks were less than in established producing areas.

What has the Burdekin to offer? The soil is fertile, ample water is available for irrigation, and the winter climate is invariably favourable for growth in temperate vegetables. In addition, little or no rain falls during the May-November period. Outbreaks of disease such as anthracnose and the bacterial blights, which are normally associated with moist, humid weather, are therefore rare. There is the further fact that the crop matures in spring and is harvested in fine weather with little or no prospect of rain damage.

In 1958, 749 acres were planted by 89 growers in the Burdekin Valley. Yields varied from farm to farm but were generally high and averaged about 24 bushels to the acre of uncleaned seed which graded out extremely well.

Crop Management

Several growers have now had experience in handling the crop and some of the earlier faults in crop management noted in 1957—poor land preparation, ineffective weed control and inadequate fertilizer applications—give little trouble.

Planting begins in early April and continues until the end of June. Crops which are planted at a later date usually mature in relatively hot, dry weather when the seed is very susceptible to mechanical damage during normal threshing operations.

Where necessary, irrigation precedes planting to that the soil is wetted to a depth of about 2 feet before the seed is sown. Single row and double row planters with fertilizer attachments are used to to establish the crop and do a remarkably good job, provided the seed is clean and reasonably uniform in size.

Plate 1

Bean Plants in the Full Pod Stage with Leaves Pulled Aside to Show the Pods. Yields in the Burdekin average more than 20 bushels of seed to the acre.

Planting rates vary considerably from 25 lb. to 60 lb. to the acre, but the general trend is towards the lighter rates of sowing. Initially, row spacings and plant spacings in the row showed a similar diversity. It would appear, however, that a 3-ft. spacing between rows and a 4-in. spacing between plants in the row will become standard practice in future. Cultivation problems are negligible in crops established at these spacings.

Fertilizer schedules now follow closely normal practice in southern Queensland, with minor modifications suggested by the known characteristics of the alluvial soils in the Burdekin Delta. Typically a 4-15-2 basal mixture is applied at a rate of 300-450 lb., to the acre, but, on some soil types, this amount could be increased substantially with advantage. Sulphate of potash, however, replaces the muriate of potash in the conventional mixture of this type as a precaution against possible chlorine toxicity, which has been recorded in crops such as tobacco when grown in the area. Sulphate of ammonia is used as a side dressing at the rate of about 100 lb. to the acre applied some two or three weeks after germination in the field.

In some seasons, molybdenum sprays are beneficial. Reserves of this element in the soil are marginal, and quick responses to treatment have been obtained in bean crops where deficiency symptoms were reported.

All crops are furrow-irrigated as and when necessary at a rate of about 2 in. at each application. Waterings however, vary with the soil type and the incidence of rain (if any) during the growing period.

Pests and Diseases

Insect pests such as bean fly, corn ear worm and pod borer are sometimes active but cause little damage when DDT sprays are applied regularly to the growing crop. Substantial losses may occur, however, when, for any reason, control measures are not carried out systematically.

Diseases are not troublesome. Pythium, rhizoctonia and sclerotina have caused some pod damage but this seldom reaches commercial proportions. No outbreaks of anthracnose, halo blight or common bacterial blight have been reported from the district since the inception of commercial bean seed production.

For the Future

The results achieved to date by commercial growers confirm the view held by well-informed observers that the Burdekin Valley has all the essentials—a well-drained soil, a dry winter climate and ample water—for the production of bean seed with the specifications required by the green bean industry. The more important of these are freedom from diseases such as halo blight, common bacterial blight, and anthracnose, which are seedborne, and high percentage germination The Burdekin Valley lends itself to volume production of seed at competitive cost in a climate where outbreaks of the mors important diseases are unlikely to occur. In this respect, the area is almost unique.

Given reliable sources of mother seed, the Burdekin in particular, and the dry tropics in general, could become increasingly important as sources of seed supplies for the Australian green bean industry.

Plate 2

Bean Seed Crop. Note the wide spacing between rows which is a normal precaution against the spread of disease.

* * *

Propagating Tropical Fruit Trees

Normal budding and grafting are not usually successful on tropical fruit trees like the litchi. But marcotting, or gooteeing as it is sometimes called, gives satisfactory results.

Marcotting involves treating a branch of a selected tree in such a way that it grows its own root system. The rooted branch is then cut off and planted as a separate tree.

On a straight 12 in. section of a vigorous branch, a 2 in. strip of bark is cut away around the branch. A piece of plastic about 2 ft. by 1 ft. is lapped loosely around the branch to form a cylinder 4 in. to 6 in. in diameter. This is tied tightly around the branch just below the rung section, packed with thoroughly wetted and squeezed out peat moss, and tied off at the other end. Roots will grow from above the rung section in eight to 12 weeks.

—*S. E. STEPHENS, Horticulturist.*

Orchard and Garden

Get Healthy Banana Plants. Sound, healthy planting material is the foundation of a successful banana plantation. You can't afford to risk introducing diseases like bunchy top into a new area.

Several months may elapse after a plant is initially infected before obvious symptoms of bunchy top appear. For this reason you can't be sure your planting material is safe unless you know the disease history of the plantation over at least two years.

If you're planning to plant bananas, consult your local banana inspector before lodging an application for permission to plant. He not only knows the present planting policy, but he can also list sources of supply in order of merit for efficient management, plant vigour and freedom from disease. All of these points are important to you, but none more so than an assurance that your plants will be free from bunchy top.

—*J. McG. WILLS,*
Senior Adviser in Horticulture.

Grey Mould of Strawberries. Grey mould disease of strawberries has caused severe losses this season. Fruit rotting has been common both on the farm and in the canneries.

Intermittent showers and humid weather have favoured the development of the disease. It is a fungus infection that causes a light brown, soft rot of strawberry fruit, and a grey fuzz of spores usually appears on the diseased parts.

In experiments, regular spraying with captan has given promising control. Captan is used at a concentration of 2 lb. to 100 gallons of water, or 1 oz. to a knapsack spray. Plants should be sprayed thoroughly at intervals of 10 to 14 days while weather conditions favour the spread of the disease. Rotting fruit should be removed from the plants and the patch during picking. Berries showing early signs of rotting should be discarded during packing operations.

—*B. L. OXENHAM,*
Senior Pathologist.

Plant Grafted Passion Vines High. Grafted passion vines must be planted with the stock-scion union well above ground level. If the union is below the surface of the soil, the benefits derived from the Fusarium-resistant stock may be lost completely.

Deep planting can shorten the life of grafted passion vines. The purple passion vine is grafted onto the golden passion vine to lessen the risk of losses from Fusarium wilt. When planted with the union below the ground, the purple passion scion may develop its own root system which is susceptible to disease.

If you use a surface mulch to conserve soil moisture keep it well away from the base of the vine. A rotting mulch provides ideal conditions for the entry of root rot organisms. Once this happens, it's only a question of time before the vine dies.

—*R. L. PREST,*
Senior Adviser in Horticulture.

Brucellosis-Tested Swine Herds (As at 1st December, 1959)

Berkshire

Clarke, E. J., Mt. Alford, via Boonah
Cochrane, S., "Stanroy", Felton
Cook, F. R. J., Middle Creek, Pomona
Crawley, R. A., Rockthorpe, Linthorpe
Edwards, C. E., "Spring Valley" Stud, Kingaroy
Farm Home For Boys, Westbrook
Fletcher, A. C., "Myola" Stud, Jimbour
French, A., "Wilson Park", Pittsworth
H. M. State Farm, Numinbah
H. M. State Farm, "Palen" Stud, Palen Creek
Handley, J. L., "Meadow Vale", Lockyer
James, I. M. (Mrs.) "Kenmore" Stud, Cambooya
Kimber, E. R., Block 11, Mundubbera
Law, D. T., "Rossvill" Stud, Aspley
Lees, J. C., "Bridge View" Stud, Yandina
Ludwig & Sons, A. R., "Beau View" Stud, Beaudesert
O'Brien & Hichey, J., "Kildurham" Stud, Jandowae East
Orange, L. P., "Hillview", Flagstone Creek
Pfrunder, P. L., Pozieres
Potter, A. J., "Woodlands", Inglewood
"Tayfield" Stud, Taylor
Q.A.H.S. & College, Lawes
Regional Experiment Station, Hermitage
Rosenberger, N., "Nevrose", Wyreema
Schellback, B. A., "Redvilla" Stud, Kingaroy
Smythe, E. F., "Grandmere" Stud, Manyung, Murgon
Stark, H. L., "Florida" Stud, Kalbar
Thomas & Sons, F., "Rosevale" Stud, Laravale
Traves, G., "Wynwood" Stud, Oakey
Weier, V. F., "La Crescent", Clifton
Wolski, A., "Carramana", Warra
Young (Jnr)., W., Kybong, via Gympie

Large White

Assenbruck, C., Mundubbera
Barron Bros., "Chiltern Hill", Cooyar
Bell & Son, E. J., "Dorne", Chinchilla
Butcher, Dr. B. J. & Parnwell, A. J. Plunkett, via Tamborine
Clark, L. D., Greens Creek, Gympie
Duncan, C. P., "Hillview", Flagstone Creek
Fowler, S., "Kenstan", Pittsworth
Franke, H. J., "Delvue" Stud, Cawdor
Garrawin Stud Farm Pty. Ltd., 657 Sandgate Rd., Clayfield
Gibbons, A. E. H., Mt. Glorious
Gibson, H., "Thistleton" Stud, Maleny
H. M. State Farm, Numinbah
Hall, M., "Milena" Stud, D'Aguilar
Heading, J. A., "Highfields", Murgon
Horton, C. J., "Mannuem Brae" Stud, Mannuem, Kingaroy
Hutton, G., "Grajea" Stud, Cabarlah
Jensen, S., Rosevale, via Rosewood
Jones, K. B., "Cefn" Stud, Clifton
Kahler, J. & S., East Nanango
Kanowski, A., "Exton", Pechey
Kennard, R. B., "Collar" Stud, Warwick
Larsen, H. L., "Oakway" Stud, Kingaroy
Law, D. T., "Rossvill" Stud, Aspley
Lees, J. C., "Bridge View", Yandina
Lobegeiger, L. C., "Bremer Valley" Stud, Moorang, via Rosewood
Mack, A. J., Mundubbera
Palmer, A., "Remlap", Greenmount
Pampling, G., Watch Box Road, Goomeri
Postle, R., "Yaralla" Stud, Pittsworth
Powell, R. S., "Kybong", Gympie
Q.A.H.S. & College, Lawes
Radel, V. V., Coalstoun Lakes
Regional Experiment Station, Biloela
Robinson, O. R., & O. J., "Linvale", Argoon, Biloela
Skyring, G. I., "Bellwood" Stud, via Goomeri
Stanton, H. R., "Tansey" Stud, via Goomeri
Stewart, L., Mulgowie, via Laidley
Stumer, K. F., French's Creek, Boonah
Wharton, C. A., "Central Burnett" Stud, Gayndah
Wieland, L. C. & E., Lower Cressbrook, Toogoolawah
Zahnow, W., Rosevale, via Rosewood

Tamworth

Armstrong, H. J., "Alhambra", Crownthorpe, Murgon
Booth, J. D., Swan Creek, Warwick
Campbell, P. V., "Lawnhill" Stud, Lamington
Coller, R. H., Tallegalla, via Rosewood
Fletcher, A. C., "Myola" Stud, Jimbour
Herbst, L. "Hillbanside", Bahr Scrub, Beenleigh
Kajewski, W., "Glenroy" Stud, Glencoe
Kanowski, S. E., "Miecho", Pinelands
Potter, N. R., "Actonvale" Stud, Willcamp
Regional Experiment Station, Kairi
Salvation Army Training Home For Boys, "Canaan" Stud, Riverview
Skerman, D. F. L., "Waverley", Kaimkillenbun
Stephens, T., "Withcott" Stud, Helidon
Thomas & Sons, F., "Rosevale" Stud, Laravale
Wieland, L. C. & E., Lower Cressbrook, Toogoolawah

Wessex Saddleback

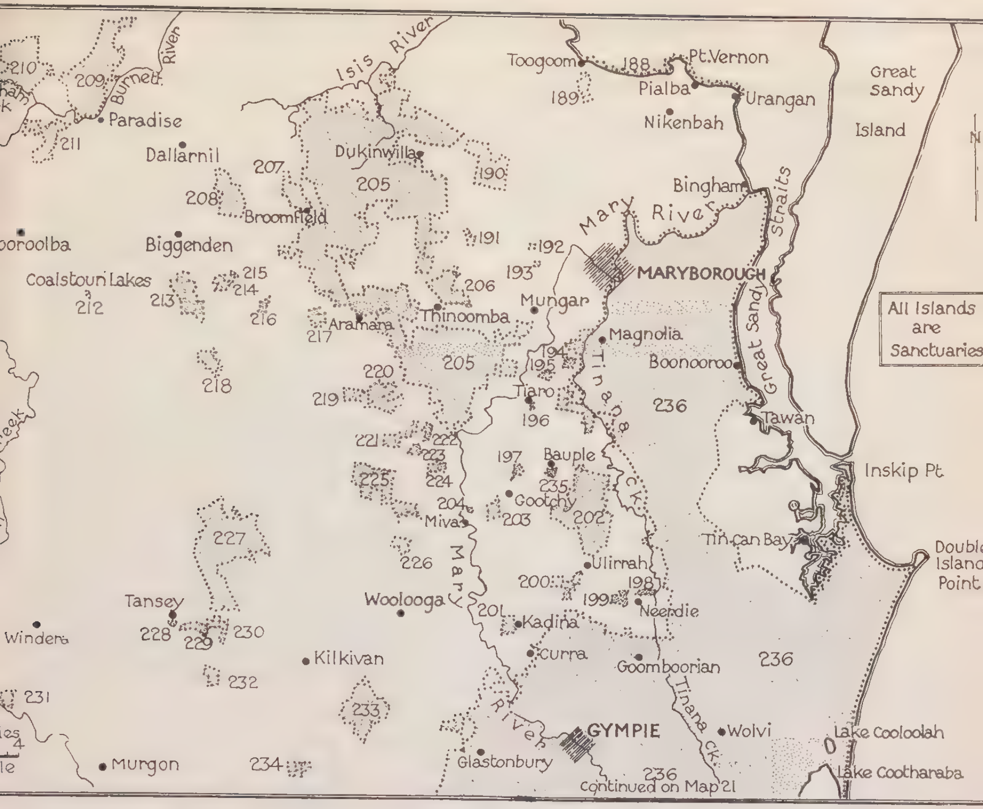
Ashwell, J., "Green Hill", Felton South
Cooper, G. J., Neumgua
Douglas, W., "Greylight" Stud, Goombungee
Dunlop, J. B., "Kunawyn", Acacia Road, Kuraby
Kruger & Sons, "Greyhurst" Stud, Goombungee
Law, D. T., "Rossvill" Stud, Aspley
Mack, A. J., Mundubbera
Scott, A., Wanstead Stud, Grantham
Smith, C. R., "Belton Park", Nara
"Wattledale" Stud, 432 Beenleigh Road, Sunnybank

Large Black

Pointon, E., Goomburra

Landrace

D. G. Grayson, Killarney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Lake Cootharaba

Map 20—Sanctuaries in Part of Fauna District No. 1.

Queensland Fauna Sanctuaries

By C. ROFF, Fauna Officer

(*Continued from August, 1958*)

The following is an index of the sanctuaries outlined in Map 20:—

Index No.	Sanctuary	Area in Acres
188	Foreshores of Hervey Bay, Parishes of Vernon and Urangan ..	375
189	State Forest Reserve 682, Parish of Vernon, via Toogoom ..	2,230
190	State Forest Reserve 1, Parishes of Warrah and Ferguson, via Howard	8,000
191	State Forest Reserve 576, Parish of Dunmora, via Oakhurst ..	480
192	State Forest Reserve, 563, Parish of Ferguson, via Oakhurst ..	278
193	State Forest Reserve 574, Parish of Ferguson, via Oakhurst ..	493
194	State Forest Reserve 990, Parish of Young, via Owanyilla ..	401
195	State Forest Reserve 965, Parishes of Young and Tiaro, via Tiaro	505
196	Tiaro Swamp, Tiaro	119
197	National Park Reserve 453, Parish of Gundiah, Mount Bauple, via Bauple	640
198	State Forest Reserve 944, Parish of Neerdie, via Neerdie	595
199	State Forest Reserve 904, Parish of Neerdie, via Neerdie	1,080
200	State Forest Reserve 906, Parishes of Curra and Gootchy, via Gunalda	2,306
201	"Durramboi," via Kadina	957

Index No.	Sanctuary	Area in Acres
202	State Forest Reserve 958, Parishes of Gundiah and Neerdie, via Gundiah	6,200
203	State Forest Reserve 940, Parishes of Gootchy and Gundiah, via Miva	1,565
204	Carswell's Lagoon, Miva	11
205	State Forest Reserves 8, 57, 676 and 864, National Park Reserve 336, Parishes of St. Mary, Woocoo, Gungloon, Doongul, Warrah, Dunmora, Kolbore, Kullogum, Broomfield, and Boompa, via Aramara	159,380
206	State Forest Reserve 12, Parish of Gungloon, via Thinoomba	5,445
207	State Forest Reserve 830, Parish of Broomfield, via Broomfield	3,451
208	State Forest Reserve 287, Parish of Woowoonga, via Biggenden	5,600
209	State Forest Reserve 169, Parishes of St. Agnes and Chin Chin, via Mount Perry	19,915
210	" Swindon Mountain," via Mount Perry	12,106
211	" Wateranga," via Brynestown	6,265
212	Coalstoun Lakes, via Biggenden	65
213	National Park Reserve 862, Parish of Mungore, Mount Walsh, via Biggenden	7,380
214	Properties at Lakeside, via Biggenden	1,500
215	Lakeside Lagoon, via Biggenden	115
216	State Forest Reserve 550, Parish of Boompa, via Boompa	337
217	Property of A. H. J. Raddon, Brooweena	1,166
218	State Forest Reserve 25, Parish of Boompa, via Boompa	2,000
219	State Forest Reserve 543, Parish of Glenbar, via Glenbar	1,078
220	State Forest Reserve 518 and 536, Parish of Glenbar, via Glenbar	4,973
221	State Forest Reserves 206, 528, 531, and 535, Parish of Glenbar, via Glenbar	6,108
222	State Forest Reserve 580, Parish of Glenbar, via Glenbar	563
223	State Forest Reserve 525, Parish of Glenbar, via Glenbar	611
224	State Forest Reserve 523, Parish of Glenbar, via Glenbar	545
225	State Forest Reserves 50 and 301, Parishes of Glenbar and Miva, via Miva	9,695
226	State Forest Reserve 420, Parish of Miva, via Miva	795
227	State Forest Reserve 67, Parish of Grongah, via Tansey	22,840
228	Tansey Reserve, via Goomeri	95
229	Boonara Creek, via Goomeri	1,383
230	Boonara Run, via Goomeri	1,071
231	Barambah Creek, via Murgon	660
232	State Forest Reserve 355, Parish of Kilkivan, via Kilkivan	960
233	State Forest Reserve 220, Parishes of Kilkivan and Brooyar, via Kilkivan	9,700
234	" Kabunga," via Kinbombi	761
235	Sugar Mill Swamp, Bauple	643
236	Area within the original boundaries of the abolished Shire of Granville	1,915,520
	Waterworks Reserves 151 and 426, Teddington	
	Shire of Maroochy	
	Shire of Noosa	
	Shire of Widgee	
	City of Gympie	
	Miners' Homestead Lease No. 5533, Tamaree	
	Lake Doonella, Tewantin	
	Town of Tewantin, Tewantin	
	Mount Cooroy Reserve 585, Parish of Tewantin	
	Noosa River Inlet	
	Railway Reserve, Palmwoods	
	Properties of A. J. Thynne, A. Marshall, and A. W. Thompson, Maleny	
	Obi Obi Creek, Maleny	
	(This area includes a number of State Forest and National Park Reserves)	
	(Balance in Map 21)	

Plate 8

Lake Cootharaba Fauna Sanctuary, via Tewantin. Photograph by Queensland Railways Department.

* * *

Seasonal Calving For Dairy Cows

The results obtained from herd recording show that cows which calve at certain times of the year give greater quantities of milk and fat than those which calve at other periods.

Although the most favourable period varies slightly for different districts, the third quarter of the year is the most conducive to higher yields.

Many farmers have taken advantage of this information to increase the returns from dairying at no additional cost. They calve all their cows in the third quarter. By so doing, their herds dry off in May, and the farmer has two months in which no cows are milked. This enables the farmer and his family to take a well-earned holiday, or to concentrate on other farm activities.

Anyone who wishes to practise seasonal calving requires a strong paddock in which to keep the bull. Matings should be confined to October and November. Although it may take some years before it is possible to have all cows calving in the third quarter of the year, the results more than compensate for the extra trouble.

—J. E. REID.
Chief Adviser, Herd Recording.

Save Lives With These Swimming Rules

In one year in Queensland, 17 children up to the age of 14 were drowned. Each year these tragedies continue to happen.

The water safety of the children in your care depends on YOU—and there is much you can do about it. So refard these safety rules as a matter of LIFE and DEATH, as they could well be.

1.—*Parental Supervision.* Case histories of drownings show without a doubt that more of these tragedies could have been prevented by this than any other precaution. So make this your No. 1 water safety rule. Always supervise children all the time they are in the water, whether they can swim or not.

2.—*Learning to Swim.* Eight years is a good age for the average child to start learning to swim. When children do start they should be taken to baths often enough to make this learning effective. **But your part does not end here. This alone does not make your child safe in the water.** Do not be misled by the abilities of a few young champions. Few children under the age of puberty can swim strongly. They still need parental supervision all the time they are in the water.

3. *Water Holes.* Forbid diving into water holes unless you personally make certain there are no "snags," and that the water is deep enough for diving.

4. *Fitness for Swimming.* Make sure children are quite well before you allow them in the water.

5. *Times of Swimming.* Always insist on the lapse of at least an hour after a meal before allowing children in the water.

6. *Control of "Fooling."* Always keep a sharp eye out for dangerous horseplay in the water and around the edges of swimming baths.

7. *Helping Others.* Teach your children to be ever ready to help others in the water. Point out that the better they can swim the more it is up to them to keep a protective eye on those less able to take care of themselves.

8. *Insist on All the Rules of Safe Surfing.* Forbid children the water unless they can be relied on to observe all the rules of water safety.

Best Recipe of the Month

Dry Bean Dishes: Possibly the best way to use dry beans is as an addition to soup and stew dishes, at the same time adding to the nutrient quality of the diet. The dry beans are soaked overnight and then added to other ingredients when cooking begins. Dry beans may be used in special meatless dishes such as—

Bean and Tomato Pie: 2 cups of Cooked Beans, 2 pints of Tomato Pulp, small amount of Butter, 1 large Onion, Bread Crumbs.

Method: Cover the base of a casserole with the cooked beans, followed by a thin layer of finely sliced onion, then a layer of tomato pulp. Repeat until the dish is almost full, finish with a layer of tomato sprinkled thickly with bread crumbs and dot with butter. Place in a moderate oven and bake gently for 2 to 3 hours.

Requirements of a club secretary—II

By J. PARK, State Organiser, Junior Farmers' Organisation

IT is the secretary's responsibility to send notices of meetings to all those entitled to attend. Members of the club advisory committee should receive copies of all notices sent out. It is most desirable that the secretary contact the "back sliders," and encourage them to attend meetings once again. Very often, special efforts will have to be made to encourage the regular attendance of shy members or members who have long distances to travel. A telephone call, as well as the routine meeting notice, will make these members feel that they are really wanted. Make sure that the "notice of meeting" cards are being sent out in sufficient time to ensure delivery well in advance of the meeting date. This is particularly important in the case of special meetings or when the regular night has to be changed. The notice of meeting should also include details of the important business to be dealt with.

Before the Meeting

In addition to notifying everyone of the date, time and place of the meeting, the secretary will need to make sure that the meeting place has been booked and that an agenda has been drawn up. The agenda is a list of things to be dealt with at the meeting, and it should be gone through with the chairman or club leader before the meeting takes place. It will help the chairman if notes and reminders are written on his copy. After having conferred with the chairman, the secretary should advise members of any special duties they may be asked to perform. Those who have to propose and second a vote of thanks should receive, in writing, the name and title of the person to be thanked. When reports have to be submitted, it is the secretary's job to see that the persons responsible for these reports have prepared them, and that they are ready to present them at the appropriate time.

Following is a specimen agenda, which may be useful to chairmen and secretaries:

1. Chairman declares meeting open; gives special welcome to any guests, visitors and advisers present.

2. Chairman calls for and accepts apologies for absence from the meeting.

3. Secretary reads minutes of previous meeting; chairman asks for motion to confirm.

4. Chairman calls for business arising out of minutes. (Secretary lists all items.)

5. Secretary reads inward and outward correspondence; lists the letters. Letters need not always be read in full. The importance of their contents will determine this.

Letters containing urgent or important matters should be listed separately.

6. Chairman calls for business arising out of correspondence.
7. Treasurer reads the financial report and presents accounts for payment.
8. Chairman calls for other reports.
9. Chairman introduces new members.
10. Chairman calls for notices of motion.
11. General Business: Chairman deals with items listed and asks for any further items.
12. Chairman announces guest speaker, discussion, or whatever has been arranged.
13. Chairman calls for vote of thanks.
14. Chairman announces date and place of next meeting.
15. Chairman closes meeting.

During the meeting

The secretary or the assistant secretary will call the roll or make sure that the names of those attending the meeting have been recorded. The secretary must next ensure that a quorum is present. This is the minimum number of members who must be present before business can be done. (A quorum at any regular meeting of a Junior Farmer Club shall be one quarter of the members entitled to vote or a minimum of five members in those clubs with a membership of less than 20.)

It is customary for the secretary to sit on the left of the chairman. The chairman may look for and expect information and assistance from the secretary at all stages of the meeting. The secretary "takes" the minutes of each meeting. The minutes are a written record of what takes place. Where there is much buisness conducted at a meeting, the full details are taken by the assistant-secretary, who writes up the minutes in the minute book. The Secretary makes a note of the action which he or she is required to take as a result of decisions made at the meeting. The secretary will obtain the minute book as soon as it has been written up and confirm that all the necessary action has been taken. Minutes must be accurate. The exact words used in motions should be recorded, and the names of proposers and seconders noted. It is desirable that the main arguments for or against important motions should be briefly recorded.

Care Of Your Battery

Just a few minutes' attention once or twice a month will protect your battery and keep it functioning at its best.

It is most important that the batteries should be kept "topped-up" and clean. Merely squirting a little distilled water in the battery is no longer regarded as modern battery servicing.

For the few minutes periodic servicing it is advisable to adopt the following routine:—

1. Clean top of battery—washing with soda solution if necessary.
2. Inspect battery cables—undersized, frayed or corroded cables prevent easy starting.
3. Clean and grease battery terminals.
4. Test specific gravity of cells.
5. Add pure water only if necessary. Water level in cells should be approximately ⅜ in. above plates.
6. Do not over-fill. It can result in dilution of the electrolyte and may also spill, resulting in corrosion.

—C. G. WRAGGE,
Agricultural Engineer.

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